The Man of the Hills

The skies are his and the hills are his and the valleys that lie between
The buck that drinks at the mountain run or feeds on the tender green.
The stars are his and the clouds are his and all that the eye may scan—
The forest, creeks and the trails and peaks, belong to the redshirt man.

Since "cinching up" fully sixty miles have vanished along the trail—
His burro has rattled his blackened kit all day at his bronco's tail,
The only sound that the rider heard, as he rode o'er the virgin land.
Save now and then a whispered voice he never could understand.

He hobblies his beast on the grassy banks where the crystal streams
have met
For ages gone, and he browns some meat and fashions a cigarette—
He stirs the blaze and a pitying eye he casts toward the world of men.
With nary regret for the things he's missed, or the man that he might have been.

The stars come out—his stars, they are the stars that but shine for him.
The haze comes down and the breezes sigh and the line of the hills
grows dim;
He wraps himself in his blanket grey and under the stars sleeps well—
A sweeter sleep than a man may know who never has felt the spell.

When the dawn's first streak and the reddened glow of his dying fire
have met,
He shakes the dew and he browns some meat and fashions a cigarette;
He "cinches up" and the wandering two drink from the crystal run—
A hearty "Yeah!" and then away in the path of the rising sun.

Away beyond, where the sun comes up and the strife and the greed
run strong,
Where might is right and the weak are lost, there's a host of men
who long
To take the hand of the redshirt man in a world that's but made for one.
And lope away at the break of day in the path of the rising sun.
—JOHN D. WELLS.
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The Forest Ranger’s Charge

“You will see to it that the water, wood, and forage of the reserves are conserved and wisely used for the benefit of the home builder first of all, upon whom depends the best permanent use of lands and resources alike. The continued prosperity of the agricultural, lumbering, mining, and livestock interests is directly dependent upon a permanent and accessible supply of water, wood, and forage, as well as upon the present and future use of these resources under businesslike regulations enforced with promptness, effectiveness, and common sense.”

—James Wilson.
THE KAIMIN—During the spring of 1915, toward the close of the first year of the Forest School of the University of Montana, the students conceived the idea of publishing an annual to commemorate the success of the youngest forest school in the country. In casting about for a name for the publication, the word KAIMIN was suggested, that name having been for the past decade associated with publications edited by the students of the university. The word KAIMIN is a word taken from the language of the Selish tribe of the Flathead Indians, who formerly camped on what is now the campus of the university, and means "something in black and white" or "something written." In order to indicate the connection of the book with the school, and to distinguish it from the Montana Kaimin, the student newspaper, it was decided to call the issue THE FORESTRY KAIMIN.

Accordingly, the first volume of the Forestry Kaimin was issued. It was a modest booklet intended to show the aims, purpose and spirit of the school and to indicate to our friends the character of the work that was being done by the undergraduates.

The subject matter and drawings of this year's publication have been prepared, for the most part, by the students and faculty of the school. We are indebted to the Office of Geography of District One, U. S. Forest Service, for the personal interest taken in our annual and for the excellent articles and drawings appearing in their department.
We wish to thank the Red River Lumber Company, of Minneapolis, for the anecdotes of the invisible hero of all logging camps, Paul Bunyan.

To the advertisers, who made the publication of the book possible, we give credit for a most willing response to our solicitations. As will be noticed through the pages devoted to that department, we are honored by advertising matter from the manufacturers of goods of national reputation, and of special interest to men engaged in forestry work or woods operations.

TRAINING AND EDUCATION AND A WORD ABOUT CULTURE

A merely casual acquaintance with our contemporaries, and—we say it advisedly—our commentators, establishes our conviction that editors may rush in where angels fear to tread. It is with this intrepid spirit that we offer comment on training and education and add a word about culture.

Mere education, we believe, was first represented in the curriculum of the little old red school house by the three R's and a little geography, history and grammar thrown in to generously heap up the cultural cornucopia or perhaps to demonstrate the versatility of the crossroads teacher.

Training as it first appears in modern curricula is represented by such subjects as manual arts, crafts work, drawing and painting, music, and later by all forms of professional and vocational teaching.

The right purpose of kindergarten, grammar school, high school and university alike, is to develop men and women for useful living. As a broad principle of economics we hold that the world may never be overcrowded with trained people; that there is room for any large number of merely well educated but untrained men and women, we greatly doubt. Cultural education often rather unfit the individual for doing useful work, or at least predisposes him against doing such work.

Most of the permanent progress which has been made in the world of late, and we put it this way with a knowledge that the world is very old, has been by virtue of the training which men have rather than by grace of their education. Culture, we find, in the stress of great trouble is after all but the polish of a thin veneer. Comes a personal controversy between faculty professors, the heat of a political campaign, the horrors and atrocities of a world's war—and it warps and blisters and cracks and peels away. Underneath where it spread its immaculate surface men are after all but as they used to be in the days when even the three R's had not appeared in the far off horizon of intellectual renaissance.

No upheaval of nations, no invasion of savage hordes, no wresting of pastoral lands from the weak by the strong, have set back the accomplishments of training. All our better ways of living, the very things that make possible the communication of culture and the spread of intelligence, once come into the world have persisted. These are the works of trained men and have been often accomplished without the aid
of education or culture; we would not be straining our point if we even went so far as to indicate that many of them are the works of men who had little of either.

That culture and education are of splendid advantage to the world may not be denied, and we believe this would be a sorry world without them. Equally certain are we that the world could not have been built to its present size and that the fabric of our entire social structure could not now exist without the work of men trained in their vocations.

Training to do useful work is essential. Education to quicken training seems important. Education merely for culture’s sake is frivolous. Culture without education is an imposter. Culture without training is futile. Culture with education and training is the realization of the professional and vocational school.

—D. S.

FRIENDSHIP

"Of all the gifts of all the years
None ever caused such smiles, such tears
As thy friendship, Friend.
The eye grows bright, the heart leaps fast
To know your love and friendship last
Without an end."

Today our men of the Ranger School go away. A hurried but withal hearty shake of the Dean’s hand, a rush up the stairs to bid goodbye to good old Jim Bonner, a few words of sincere appreciation to deliberate, thorough, painstaking Professor Drake, we overhear Spaulding’s cheery farewell to you—and you are gone.

We wonder, oh, Forest Ranger, if it means but this to you. You go out so blithely, is it that you are glad only to get back to your mountain parks and blue skies and high peaks and nestling forest glades? We, too, love your forest lands, their stately pillared halls and dim green-carpeted aisles. Now murmuring sweet and soft, now mounting in triumphant peals that fill all the forest and die away—music that throbs, then roars, then sinks again to soft kind tones, rare fine notes that only those attuned in Nature’s way may feel; and wild crash and thunder that awe, not dread, inspire—the music that sounds through the high vaulted arches and distant domes of your forest cathedrals is dear alike to you and us.

Of necessity, oh, Forest Ranger, the college professor dwells within small places. His opportunities for influence in the outside world are largely limited to you, his student. His circle of even casual friends widens slowly and, like the ripple when a kingfisher dips into the mirrored blue sky of your mountain lake, becomes more empty even with the dimming of its spreading rim. That college professor is great, indeed, who by other works than his students may project his personality very far beyond the four walls of his study.

We count on you, Forest Ranger, the first students who go forth from our school. Is your friendship when you go out so gayly ours to have and to hold? Or do you forget us?

—D. S.
OUR IDEAL

We have been criticised in our Forest School for leaning too much to
the vocational, too far toward the practical, and too little toward the
higher training of the ideal education. What we are doing in our
school is this.

We are training our men to make their living. We are training
them to take definite positions, to fill them capably, to work up, to gain
promotion, to reach a definite goal, to become a success as the term is
used in the business world. So much for their training. But training
is not all that we can give them.

We are offering them education and we use the word education in
the broadest sense of its meaning. Every facility of the university is
open to our men for this purpose. We want them to grasp the bigger
meaning of a broader horizon, we want them to see the ideals and fol­
low them, we want them to know the higher, better, finer things of life,
to know them and appreciate them. We want them to be men, broad
men and big men.

WHAT IS YOUR OPINION?

Dorr Skeels

A SHORT COURSE FOR FOREST SUPERVISORS

Our short course for Forest Rangers, or Ranger School as it is called, has
met with such marked success in training Forest Rangers to do better work
in the Forest Service, that we plan next winter to offer during the session of
the Ranger School a short course in Forestry for Forest Supervisors.

Perhaps more than half of the Forest Supervisors in the Forest Service are
men without technical training in Forestry except such as they have secured
for themselves by careful and extensive reading and through their contact
with the technical foresters of the Service. What these men lack in technical
training most of them more than make up by their practical knowledge of
the work gained through long experience, their intimate knowledge of western
forest economics, and their loyalty to the Service.

We believe that if with these splendid qualifications could be combined a
more technical knowledge of forestry, much could be done for the Forest
Supervisor who is without professional training, to equip him for better
work in directing the activities of his Forest, and that such training should
place him on the same plane of usefulness and value as the technical foresters
in the Service who have had the advantage of an extensive forestry education,
but who lack many of the valuable qualifications of the experienced Forest
Supervisor.

Would you be interested in such a school? What courses of training or
subjects for study do you feel need for?

A QUARTERLY JOURNAL OF WESTERN FORESTRY PRACTICE

It is the ambition of the Forestry Club and the faculty of the Montana
Forest School to publish a quarterly journal of western forestry practice.
This would be a magazine of some 100 pages of a size to file handyly in the
standard filing equipment of the Forest Service, and to be published every
three months. It would be the particular aim of this magazine to report
the activities of the Forest Service in each of the seven National Forest Dis­

...
tricts, information regarding improved methods, progress in forestry practice, and the like, that are being worked out in each of the Districts.

An important feature of each issue would be a few pages of useful information and handy hints along the various lines of a Forest Ranger's work. By means of this publication, correspondence school courses would be carried on in several of the fundamental branches of forestry and forest engineering. There seems to us to be a need for just such a magazine as this which would tend to bring Forest Service men together and to permit their free exchange of ideas, opinions, and criticisms.

Its pages would be open at all times to members of the Forest Service who are able to contribute articles of merit or who would offer helpful suggestions or make useful criticisms. Its editorial columns would be reserved for fair, frank and fearless comment and would criticise only when betterment could be suggested. We try to reach every Forest officer in the United States with the Forestry Kaimin.

Write to us and let us know if you would be willing to subscribe to a quarterly journal of western forestry such as we propose, at a price to equal the actual cost of publication, or from fifty cents to one dollar for four copies each year.

CORRESPONDENCE COURSES—AN APOLOGY

Last year at the time of issuing the first Forestry Kaimin we offered correspondence study courses in forestry without cost to Forest Rangers and other officers of the National Forests. The result was a deluge of applications.

Our plan was to handle these courses by direct personal correspondence which would adapt the direction of training to the individual needs of each student.

Before the beginning of this present school year in September, 1915, the work of directing correspondence training grew to such proportions that it would require the entire time of one stenographer and nearly half the time of our faculty of instructors if it were to be properly carried on. We kept up as much of the work as we were able, but it has proved impossible with our present faculty and our small fund for stenographic assistance to give any adequate help along this line to Forest Service men. The work has been postponed with prospective students from time to time, until the amount of such work promised to Forestry men has reached a size that will require a special appropriation from the State to meet its expenses. No specific appropriation had been made for this work and no special appropriation to provide for its expense can be secured until next winter.

In the meantime we have been compelled to discontinue most of our correspondence study instruction. For men already receiving this work, and for prospective students to whom definite promises have been made, we shall make every effort to continue the direction of their training until the course outlined for them is completed. Such correspondence will necessarily often be delayed. We ask your patience.

In order that we may properly estimate the expense for such work, and thus be in better position to secure a proper allotment of funds, we ask prospective correspondence students to write us, stating what lines of study they desire, for how long a period, and at what time of the year.
SPRING CAMP! What pleasant memories those magic words bring to the minds of the upper-classmen, what pleasant anticipation of future joys to the freshmen; days to come spent in profitable studies of the woods, the cheer and good fellowship of camp life, the realization of visions of evenings around the camp fire with a bunch of good fellows. After having tolerated the superior bearing of the upper-classmen who were on the 1915 camp and listening to the oft-repeated tales around the big stove this winter, the freshmen are awaiting with impatience their opportunity to experience the thrills of life in the woods.

The Spring Camp was established at the close of the first year's work of the forest school, and is already looked upon as one of the traditions of the school. The object is to give the student that training which cannot be given in any classroom—to take care of himself in the woods, to better equip him to face those problems he will meet early in his career in forestry work.

Situated as the Forest School is, in the midst of a great forested region with National Forests on every side, in the heart of the logging and lumbering industry, the site for a spring camp is not a perplexing question. The Forest School will probably never establish a permanent camp; it will be the object to select sites at such points that the student may study some special project or operation that may be going on each year.

The site for the 1915 camp was an ideal one in every respect. Camp was pitched on the shore of Salmon Lake immediately adjoining the Missoula National Forest and adjacent to the 90,000 acres of timber holdings of the Western Montana Lumber Company. Salmon Lake has often been pronounced the most beautiful body of water in Montana, situated at an elevation of 4,000 feet and entirely surrounded by timber-covered mountains rising to elevations of seven, eight and ten thousand feet. The vicinity is especially adapted to the study of problems in forestry. On one hand are old cuttings, lands that were logged over many years ago and where the silviculturist may demonstrate problems in reforestation. On the other hand are primeval forests containing all the native species common to the Rocky Mountain region, where the logging engineer may compare methods of logging and transportation. On one side of the lake is a great forest administered and protected by the Federal Government and on the other the timber holdings of a corporation, where fire protection and administration are almost unknown quantities.
SPRING CAMP
SALMON LAKE 1916

- LUMBERING
- WALKING
- SIGHTING
- SPRING
- CRUISING
- CAMPING
- DOING
- OUTFITTING
- SIGHTING
- SPRING
- CRUISING
- CAMPING
- DOING
- OUTFITTING
To outline the instruction given during the brief term of the Spring Camp is not the purpose of this article. The primary object, as mentioned above, was to instruct the student how to take care of himself in the woods. Nearly every student of the school spends his summer vacation in the employ of the U. S. Forest Service and the work was so arranged that he would be better equipped for this work. Instruction was given in camp cookery, camp sanitation, problems in extensive and intensive surveys and mapping, sections of logging railroads were located, the classes in scaling and cruising made volume tables and estimated timber stands, all of the elusive section corners in the vicinity of the lake were traced to their lairs, the Bureau of Entomology is engaged in making a special study of insect-infested trees on the Clark lands which gave those interested an opportunity for research work.

But as the boys gathered round the stove in the drafting room last winter, and the conversation switched to Spring Camp, as it invariably did, there were no arguments heard as to the advantages of railroad logging in that district, neither were skidding factors or logging costs discussed. The topic of conversation generally seemed to center around a certain snipe hunt where one Jack Layton played a prominent role; tales were heard about the three juniors who attempted to shoot the treacherous rapids of the Clearwater River in a canoe manufactured for the occasion; there were arguments about the relative speeds of the motor boats of the Missoula Rod and Gun Club and those of the W. A. Clark fleet.

The first annual Spring Camp was a pronounced success from every point of view. Aside from the regular instruction in camp the students received practical experience under the tutelage of F. T. Stoddard, highway engineer who was engaged in laying out a section of the Park-to-Park Highway along the east shore of the lake, and in laying out the trail to the Clark look-out station on West Peak. Aside from the instruction and experience, the camp was worth while from many other points of view. Friendships were formed that will never be broken, the memories of fond associations with good fellows around the camp fire, mingled with song and story.

After all, there is no experience so valuable to the forester as that acquired in God's own laboratory, the Forest.

HOW TO GET MORE COPIES OF THE FORESTRY KAIMIN.

If you are a Forest Guard, Forest Ranger, Forest Supervisor, Forest Examiner, or other Officer of the Forest Service of the United States Department of Agriculture, and you did not receive a copy of the 1916 issue of the Forestry Kaimin, write to us and a copy will be sent you free. If you are a Forest Supervisor or a Forest Ranger, we would like a list of your Forest Guards in order that copies may be sent free to them.
Not all good necessarily comes from classroom or recitation. Those Monday night meetings bid fair to become the most interesting and instructive "communiques" on the campus. Planned by the students, organized by the students and officered from the student body of the Forest School, the Forestry Club is the Senate of the school, and Court of Last Appeal, before whose cold bar of Justice, Shorthorn, Longhorn and Prof. plead in vain for the "pet of fancy" and the "child of mind." The District Forester and his staff, the local Forest Supervisor and the many transient Forest Officials here frequently discuss the newer policies and plans of the Forest Service. On alternate Monday evenings the Club's rooms are turned over to the local section of the Society of American Foresters, thereby allowing the students an unrivaled opportunity of listening to, and entering into, the discussion of technical or administrative policies of the highest import to the Service, the Lumberman and the Forester.

The Forestry Club meetings are dedicated to orderly informality; consequently, congeniality. The aftermath of "stunts" and "feed" speed the parting guest to slumber and the student to the morrow's quiz. Any Forest School student, be he regular or Ranger School, may join if he so desires—and by the way—the Short Course men surely make the meetings hum during their too brief stay with us. Among the Service men who have talked during the past winter are Assistant District Foresters Rutledge, Adams, Flory and Fenn; Forest Supervisors McLaughlin, Koeh and Leavitt, and Superintendent of Trail Construction Clark.

The Forestry Club? Oh, yes—they staged the Lumberjack's Ball and
it was some Ball. For the first time in history the big gymnasium was packed and jammed with a happy care-free throng with a coterie of two-gun sheriffs guarding every approach. Luckless was the unfortunate inside a starched collar or boiled shirt or behind a baby blue ribbon, for Judge Wolfe had no mercy and it cost four-bits to even look "dolled up." "Yea—it were a costume dance." And the Timber Willies with swonkies and staged malones pionneted Vernon Castle’s latest with the damsels from the old cow camp. The decorations—banked fir and spruce trees, placarded with fire warnings, and the old style camp dinner, were not the least of the attractions—nor was the big log campfire, with its deacon seats, neglected by those too staid, too stiff or too weary to dance. Sure, it’s to be an annual function.

The credit for the success of the Forestry Club, its programs, its frolics and the underlying serious vein must be given to the President, Kenneth Wolfe, Vice President Willard Jones, Secretary Lyle Hodson, Treasurer Charles Wingett and the various committees, who so ably assist them.

THE COWBOY AND THE TEMPTER

I met a well-dressed stranger at the bar in Poker Bill’s;  
I had just come off the roundup in the far Red Desert hills.  
He spent his gold most liberal, but he overplayed his hand  
When he tried to buy my cow horse for some distant warrin’ land.
He offered me two hundred, which he boosted seventy-five.
I let him talk his string out, jest to see where he’d arrive;  
And he looked my pony over and then says: “I’m standin’ pat  
On an offer of three hundred—and you’d better grab at that.”

Well, I needed that three hundred, and I needed it plum bad,  
But the thought of selling Teton didn’t somehow make me glad,  
And I says: “I’ve rode that pony in the rain and in the sun;  
We have romped the range together till our thoughts melt jest like one.  
I have trained him till in turnin’ he can stand upon my hat;  
You should see him on the roundup, he is quicker than a cat;  
When I throw a steer, that pony holds the critter till I tie,  
And he loves the game he’s playin’, you kin see it in his eye.

“That there hoss which you would slaughter at the front acrost the sea  
Has shared all my troubles, and a comrad is to me.  
We have battled snows together when King Winter’s ruled the plains,  
And we’ve shared the chinook breezes and the summer’s first warm rains.  
We have dwelt in sage and cactus till we couldn’t change our home.  
When that pony travels elsewhere, why, the rider, too, will roam.  
I admit you’ve got me tempted, but my needs’ll have to wait,  
So—durn it, hoss, that stranger’s up and pulled his orn’ry freight!”

—ARTHUR CHAPMAN.
For several years the University of Montana had felt the need of a good trail of easy grade to the top of Mt. Sentinel. The old trail, hardly more than a cow path at best, combined grades from six per cent to thirty per cent in a very unsatisfactory manner. The trip was so tiring that but few could ever enjoy the commanding view from the summit.

With the advent of the Forest School at the University, plans for a good trail up the old hill became a reality. President Craighead authorized James Bonner, Professor of Forest Engineering, to start the project at once. The maximum grade was to be 14% and the tread at least 24 ins. in rock and 30 ins. in loose earth.

The first 900 feet of the new trail followed an old road that had been constructed by prospectors, many years before. The tread was in fairly good shape and the work went speedily for a few days. At the end of the old road the real work began. The location party kept well ahead of the construction crew and did not experience any particular difficulties. Locke level, level rod and tape were the instruments used and a good grade line was laid out. Switch backs were made according to the F. S. specifications. At intervals of a half mile, 200 feet of the trail was brought down to 0-0 grade. These level stretches were to be provided with benches and would afford a splendid view of the valley.

The construction work was done by student labor and for a time considerable supervision was necessary. Most of the work of supervision was left to the upper-class forestry students and after a week or two things were moving along smoothly. The trail was completed to within 200 feet of the top of the mountain, by the time snow fell, making Mt. Sentinel no longer inaccessible to the casual visitors and sightseers.

With the completion of the trail, plans were made for the construction of a look-out station. Before plans were finally made, the Forest Service offered to enter into a co-operative agreement with the Forest School, concerning the look-out station. The agreement was this: If the Forest School would build and fully equip a look-out station at
the summit of Mt. Sentinel, and turn the station over to the Forest Service for use during the fire season, the Forest Service would in return give the Forest School certain special lectures by men of the District office.

This agreement was accepted by Dean Skeels and the station constructed. The total cost of construction was approximately $500. Plans for the station were made up according to the latest design and modern equipment installed. The permanent telephone line will be built this spring, last summer's guard using an emergency line.

The Forest Service appointed C. Wingett of the Forest School as lookout on Mt. Sentinel last summer, and the station proved highly efficient. More visitors than fires, seemed to be the impression received by Wingett during the fire season.

We are taught that the fire danger can be greatly decreased by education of the public, so it seems that Wingett has played a bigger part in the fire season than mere location of blazes, for he spent several hours each day in explaining to visitors the methods of fire suppression and the part he played in the general fire plan.

So in conclusion, we will say that the trail and lookout station are a monument to the Forest School, University of Montana, and are of great educational value both to the general public and to the students of the University proper.

—Peg Lansing.
Monday following the Syracuse game saw the formal opening of the Forestry Campfire League. Hughie Kent got away for a touchdown immediately, but then Hughie had started training with the regular squad and was in the "pink." Tackle Bischoff almost broke up the game with a warm run from the south end, but was stopped in time by Lansing, who is assistant coach this year. The new assistant is very patient with the fellows and does not mind repeating over and over the way they did it in Minnesota. We had a hard time getting our quarter back for this game, but the management said we were entitled to it anyway, and so they substituted Red Stewart, saying he ought to do as he looked like 30 cents.

It was no trouble to get "full" backs as almost all the boys are back this year full of the old pep. And it's some job to stop Sanderson when he gets going. Sandy ought to be a star in the marble season. The football season closed in a blaze of glory during examination week, as the whole team became ineligible.

In the inter-department track meet last spring the old bean diet won out again. K. Wolfe had a pocket sewed on his track pants for his pipe, but Jerry made him rip it out, resulting in a victory in the high jump. Every time anyone asked Webb Jones to do anything in Spring Camp, he came back with, "Oh, I'm in training for track." But he did cop off the middle distance races at that.

Dutch Hayes showed traces of early training with his father, but every time Dutch came to a hurdle he stopped and tried to push it out of the way. But Dutch is young yet and ambitious. He holds the long distance record in the expectoration contest.

It would be useless to take up in detail all the members of the famous track team. It is enough to say that all were stars either before they came or after they left school. As the fellow said, "Distance lends enchantment."
The Annual Athletic Meet between short-course men and regular students, which was held on the 17th of January, has never been definitely decided, but the regulars seemed to have the edge on the hard guys.

The betting was pretty even until "Flaming Stewart" stepped out ready to do battle for the honor of the regular department.

Since the Rangers did not bring their sons to school with them, the only man who could meet Red's weight requirements was Lansing, a regular student, so the regulars won this event.

Professor Bonner, who had been training for the roping contest, could not take part as no cigars were allowed in the building. Riggle, however, accidentally found his lariat where he had cached it and put on a good exhibition and a speech.

In the shot put, high jump and basketball game, the regulars were successful over their rivals mainly owing to the endurance of the former. The basketball game was fast and furious, except for occasional breathing spells allowed the conditioned rangers that they might recuperate. The rangers' main trouble was in putting the ball in the basket.

Ranger Willis, of the short course department, then made himself immortal in the ranger hall of fame, by decisively beating Bill Kane of the regulars to the tune of Annie Laurie, in the piano contest. Kane showed the effects of overtraining, a fact which probably caused his defeat, although his trainer offers over-confidence as an alibi. This victory cheered the short course men, vocally assisted by the numerous district office men, who were on the bench throughout the whole meet. It was of short duration, however, Brains soon came back. The short-coursers tried to bite off a little bit too big a chunk in the log-sawing contest and spent three minutes doing it. In the meantime, old Sam rustled the coal oil can, (this is where the brains appeared), and the spectators enjoyed a minute and two or three seconds of life in a saw-mill. This concluded the meet, with the exception of some light refreshments served while the athletes were dressing. Time was not taken on this event owing to the rapidity with which it was handled.

In other lines of athletics the foresters are not lacking, either. Professor Bonner's hill-climbing class has developed two new long-distance STAR* expectoration men who expect to rate good. "Say, Peg, will this get by?"
Among the many advantages of the location of the Montana Forest School is the fact that we are able to secure work in the woods during the summer vacation. The local Forest Service officials cooperate with the School in this matter and last summer, the first of the School's history, placed over twenty students in Forest Service work. In addition five others were in private work of a forestry nature.

Fire protection took more of the boys than any other one class of work. On this were the following: Hayes, Ector, Darrow, Cook, White, Stewart, Brooks, Hodson, Richardson, Haines, and Wingett. All of these mentioned were appointed as Forest Guards for patrol, lookout or smoke-chaser duty but on account of the shortness of the fire season nearly all spent considerable time on other kinds of work such as improvement and maintenance. This gave them a much wider experience than the Guards are usually able to get.

Wolfe, Ade, Edwards, Bischoff, and Simpkins were members of a land classification party and were out until the middle of October. They report a season profitable both in experience and in financial returns.

Kent, Lansing, and Jones were in a timber reconnais-
sance party running control and sketching topography for the most of the time. Very few, who are not on the Forest Assistant list secure this kind of work in District One, so these fellows were particularly fortunate in the experience they were given.

Ross and Borland worked for the A. C. M. Lumber Co., the former doing cruising and surveying and the latter working in one of the camps on Nine Mile. McCarthy was in a grazing reconnaissance crew on the Madison. Clark went out with the Geological Survey in the Clearwater country. Vance was Assistant County Surveyor in Missoula County.

The value, to the student, of the experience gained in this kind of work can hardly be overestimated. He can study the books, attend the classes and do the large amount of field work required, but until he has been out on his own responsibility and done real, practical work, he has not been thoroughly prepared to do forestry work.

As evidence of the value of the summer work might be quoted the grades of the three regular course students who took the examination for Forest Ranger last fall. Cook, 87%; Brooks, 85.75%; Lansing, 84.5%. Most of the experience in real forestry which these fellows have had has come during summer vacations.

This idea is also good in that it "weeds out" those who do not seem to be fitted for forestry. A season spent on a lonesome lookout or in a logging camp will pretty nearly show what there is in a fellow and if he comes back for more forestry, it is with a fair conception of what he is getting into when he takes up the profession. In three or four cases last year the boys were convinced that they were not cut out for foresters and they switched to other departments.

Reports of Montana students are to the effect that they have given satisfaction, and it is expected that this condition will continue because it is the policy of the School to recommend only students who are certain to give satisfaction. The co-operation of the Forest Service and others in securing work for the boys is greatly appreciated and it is hoped will always be available.

PLANTIN'

Up the mountain and through the burn,
We climbed, and 'mongst the brush and fern,
An ole man drove his mattock home,
And slapped a tree in the gapin' loam,
"Mornin' Father, what's the game?"
"Plantin' trees," the answer came,
"You don't 'spect to live to see
The standin' timber, do ye, say?"
He looked, reflectin', down the hill;
"Wal, no," "but thunder, some' un will."
Ranger School

Short Course Sentiments

Editor's Note: The following is, verbatim, the official report of a committee of three short course students appointed by the rangers to draw up a statement of their sentiments regarding the ranger school.

The Montana Forest School provides an annual short course of instruction in practical forestry to forest rangers and others. During the 1916 winter session of three months, there were no less than 40 of us taking the course. At one of the weekly evening seminars which constitute a feature of the school, a discussion took place on "Ranger Education and the Forest School." We have compiled the sentiments expressed at that meeting and publish them in the Forestry Kaimin by direction of that meeting.

It was said that the old-time forest ranger was a "hard-fisted citizen of the west, a good mountaineer and woodsman, able to throw a rope, ride a twister and pack a mule." He was the practical man of the old school, and strange to say, the Forest Service in those days did not occupy a high place in the public esteem. With the development of a highly organized forest administration, the old hand has passed away and his place has been taken by younger and technically trained men. This, we feel, was first the case in the higher grades of the Forest Service, but in the lower grades the same displacement of the oldtimer is now rapidly taking place, and at the present time ambitious and aggressive young men with special training for their work are filling the forest guard and district ranger positions.

Such men as these are not content to be passed over in promotion and are prepared to fight their way up to the higher positions in the Forest Service. It is such men as these who are devoting their winter months and their small accumulations of worldly wealth to taking the short course of study offered by the Montana Forest School. "Brain counts today, not brawn," says one of the rangers, an ex-soldier. "The days when a fellow put on a suit of hardware and went out to kill his fellow man to win a lady's smile, are done. Soldiering is tantamount to spending the country's resources. Forestry on the other hand has a good ideal—to save and use. The work is congenial and is doing the country good, and it offers hope for advancement."

The meeting by majority subscribes to the dictum that promotion in the Forest Service is based essentially on merit. Merit, it is suggested,
may be regarded as a combination of practical experience, personality and technical training. The short course students feel that they possess the initial advantage of practical experience, and as one ranger puts it, "We can make five times as much use of a bit of education in consequence as the impractical man."

The short course, we consider, contributes to the remaining two constituent parts of merit, by personal and technical training. Success in life, it is felt, depends in a great measure on the capacity to handle and understand men, the making of acquaintances, and the rubbing together of diverse temperaments. The forest school enjoys the social advantages and facilities appertaining to relations with a large university and location within a city of 18,000 inhabitants, and offers this as part of its training and influence. A short course of personality education is of considerable value to the forester who by force of circumstances has been deprived for the greater part of the year of the essential society of his fellow men. The forestry students at the school—some ninety of them—constitute a congenial community in themselves. The regular forestry students were described by one of the "short horns" aptly enough as a "dandy, sociable bunch of fellows."

The faculty met with their admiration. Professor Spaulding, for instance, "has a way of holding you—you catch it every time." Professor Bonner, it is sufficient to say, is called Professor Jim. Professor Drake, who does not teach the ranger classes, is admired from a distance. And of the Dean—"Well, I love that man," is the expressed verdict of one student and probably the unexpressed verdict of the rest.

Of the lecturers in special subjects, experts from the district forestry office, one can say that they are men with an ideal—the ideal of one hundred per cent efficiency. Of the whole teaching staff, it can be said that they are a family of elder brothers; keen, efficient and friendly, interested in their students and enthusiasts in their subjects.

Students and teachers bring into the classrooms with them the free atmosphere of the woods, laden also with the tang of forestry technique and perfumed to a considerable degree with the fragrance—and otherwise—of tobacco. For in these classrooms students and teachers
meets as round the campfire, imbibing woods lore, held together by the bonds of mutual interest and common enthusiasm for their subject—the wide and interest-compelling theme of forestry. Informality reigns; the little jokes are appreciated and more is accomplished; it keeps the fellows full of “pep,” as it was put by one member; they are free to butt in with questions; and you “get it in chunks and digest it later.” If a man doesn’t get it he has only himself to blame.

The faculty, it was agreed, were practical, and knowing the problems to be grappled with, know the ranger’s needs. The short course cur-

riculum was voted as perfect, except, perhaps, that a ranger thirsting for knowledge, could not take in all the subjects in one year. A general desire was expressed to come again in 1917, and it was suggested that a second year short course be offered by the school embracing such subjects as forest economics, forest mensuration and valuation, elements of forest management, forest law and policy, with some more surveying and topographic mapping.

The concluding sentiments of the short course students for 1916 are that the course is uplifting and makes for individual development and enlarged outlook. The school, we all believe, is the best in the United States.

“The faculty’s all right and the courses are all right, and we’re coming back again”—was the final verdict of the rangers.

—By the Kaimin Committee of the “Short Horns.”

E. H. F. SWAIN,
A. T. BEDELL,
E. MORGAN PRYSE.
1916 SESSION OF THE RANGER SCHOOL

C. H. Allred
A. T. Bedell
C. D. Blake
G. M. Brandborg
J. A. Brower
Joseph Capponi
Thomas Carney
Charles Doot
W. V. Douglas
R. P. Edwards
Harry Friend
P. A. Goodfellow
R. S. Graves
Roy Greenup
A. J. Halverson
C. J. Hasch
Elmer Howe
L. F. Jefferson
Archie Klehm
A. V. Kunkel
J. S. Loy
L. H. McLean
George Park
Hugh Peyton
R. B. Pfrimmer
E. Morgan Pryse
A. J. Riggert
Frank D. Riggle
Douglas Roberts
L. C. Robertson
William Robison
S. C. Sanderson
Thayer Stoddard
E. H. F. Swain

Wells Thursby
W. H. Trippett
Sylver White
W. R. Willis
H. W. Zeiger

Manti N. F.
Coconino N. F.
Clearwater N. F.
Lewis and Clark N. F.
Targhee N. F.
Coeur d'Alene N. F.
District I.
District I.
Surveyor
Coeur d'Alene N. F.
Holy Cross N. F.
Missoula N. F.
Government Surveyor
Bitter Root N. F.
Flathead N. F.
St. Joe N. F.
Lewis and Clark N. F.
Scaler
St. Joe N. F.
Pend d'Oreille N. F.
Bitter Root N. F.
Cleveland N. F.
Bitter Root N. F.
Lewis and Clark N. F.
Pallisade N. F.
Missoula N. F.
Custer N. F.
Cabinet N. F.

Lewis and Clark N. F.
County Surveyor
District Forester, Narrabri

Coconino N. F.
Lewis and Clark N. F.
Madison N. F.
Prescott N. F.

Ephriam, Utah
Flagstaff, Arizona
Orofino, Idaho
Choteau, Montana
Marysville, Idaho
Wallace, Idaho
Missoula, Montana
Missoula, Montana
Polson, Montana
Wallace, Idaho
Red Cliff, Colorado
Ovando, Montana
Missoula, Montana
Darby, Montana
Big Fork, Montana
St. Maries, Idaho
Missoula, Montana
Choteau, Montana
Naples, Idaho
Santa, Idaho
Clarks Fork, Idaho
Grantsdale, Montana
Aguango, California
Hamilton, Montana
Bynum, Montana
Driggs, Idaho
Ovando, Montana
Miles City, Montana
Missoula, Montana
Driggs, Idaho
Lead, South Dakota
Choteau, Montana
Missoula, Montana

New South Wales, Australi
Ephriam, Utah
Flagstaff, Arizona
Choteau, Montana
Sheridan, Montana
Prescott, Arizona
A Ranger's Joy

Editor's Note: This poem comes to us with some other copy from the Gallatin National Forest. We have been unable to learn the name of the author.

Did you ever for a summer try a bachelor's stunt alone,
In a lonely mountain meadow forty miles away from home,
Where mosquitoes wore no muzzles and the flies knew how to bite,
And the rattlesnakes were plenty, and the coyotes howled at night?
Did you ever flip your flapsacks in a house so full of smoke,
That your tears dripped in the batter? It is funny, but no joke!
Have you burned your beans and bacon, wished devoutly for a wife?
If you haven't then you're missing half the joys of ranger life.

Have you tried to catch your horses in the meadow wet with dew,
Where grass grew rank and luscious, that wet your clothing through:
Watched them kick their heels with pleasure, and then start on the run
Across that same wet meadow 'til you wished you had a gun.
Did you finally corral them in a corner of the fence,
Stamping, snorting, wildly eager, looking for another chance
To dash by you, kick their heels up, just as though you were a stranger?
If you haven't then you're missing half the joys of a Forest Ranger.

Have you ridden for an hour by the side of a roaring brook,
Watching trout jump in the sunlight when you didn't have a hook:
When the shadows on the water were alluring as a dream,
Did you mutter a few "cuss words" as you left that tempting stream?
Did you swear by all that's holy that as sure as Sunday came
You'd be back there with your fishrod and mix with that little game;
Did you roll out Sunday morning, half awake and half asleep,
To get this little message: "Will you go count Freeman's sheep?"

Have you ridden through the Forest with the shadows at your feet,
While the grouse were drumming 'round you, and you hadn't any meat,
And the quails were thick as spatter, and you couldn't take a shot.
Did the badge on your suspenders help your feelings out a lot?
And at night when you're so tired you can hardly even eat,
Did some tourist "drop in on you" take your only easy seat,
Stick his feet up on your stove hearth, and although he is a stranger,
Tell you calmly as he rolls there, "It's a snap to be a Ranger."
PICTURESQUE MONTANA

Scenes near the campus and on nearby National Forests
Plan and Scope of the Forest School

The work of the Montana Forest School is along three distinct lines, including undergraduate courses of four years in the departments of forestry and forest engineering and a short course of fourteen weeks for forest rangers.

It is the aim of the undergraduate course in forestry to train men for the work of forest rangers and forest supervisors, and for such work with lumber companies, timber-owning corporations and the like as involves the administration, protection and utilization of forests.

The course in forest engineering offers four years of training with the purpose of preparing men in those branches of special engineering work for which there is most need in the forest. In this course men are trained for work as scalers, cruisers, lumbermen, logging engineers, and other similar employment in the lumbering industry, as well as to qualify them as forest engineers for all the requirements of engineering work in the forest.

A course of graduate training will be offered later in forest engineering work. The degree of forest engineer will then be given for one or more years of post-graduate work, following four years of undergraduate training, and after an interval of successful practice.

The ranger school, or short course for forest rangers, was created for the special purpose of training men already in woods work to do better work in forestry and particularly to improve the training of forest officers. It is distinctly not a course for inexperienced or unprepared men.

A forestry club with a membership of 70 students and faculty members, meets fortnightly for the purpose of reading technical and professional papers, informal discussion of forestry problems, and to promote a social spirit among the members. Some man of prominence in forestry, conservation, or engineering work, or in the lumbering industry, is the guest of the club at each meeting.

The Missoula section of the Society of American Foresters holds its regular fortnightly meetings in the rooms of the forestry club. This is a national organization of the professional foresters of the United States. The headquarters of this society are in Washington D. C., besides which a section is maintained with the headquarters of each of the seven districts of the National Forest Service. The membership of the Missoula section is composed of the professional foresters in the office of the District Forester, and the members of the faculty of the Forest School. The regular fortnightly meetings are open sessions to which the students of the school are admitted. Professional papers dealing with subjects of technical forestry are read and discussed.

ADVANTAGEOUS LOCATION OF THE SCHOOL.

The school is very favorably located in the great Inland Empire timber region of the northwest. Every forest type of the inland northwest is found within a few miles of the school. Two transcontinental railroads, three branch railroads and two interurban electric lines place
the school within easy reach of a great number of logging, lumbering, and lumber manufacturing operations.

The headquarters of District I of the United States Forest Service are located in Missoula, as are also the offices of three forest supervisors. The boundaries of the Lolo National Forest, the Bitter Root National Forest and the Missoula National Forest are closely adjacent to the school and include over 3,000,000 acres of government timber lands, under forestry management. The boundaries of nine national forests and two other government timber reservations are within 50 miles of the school. The boundaries of 17 national forests, three other government timber reservations and a national park are within 100 miles of the school.

The school is located at the foot of the steep slope of Mount Sentinel. On the top of this mountain, reached by 3½ miles of trail from the forest school, is a lookout station maintained by the school in co-operation with the forest service for the protection of national forests from fire. This station is used as a laboratory in the study of fire protection methods, and during the summer is used by forest officers in the actual fire protection work of the Forest Service.

In co-operation with the Forest Service special lecturers from the staff of specialists in the office of the district forester assist in the training
of the students in the forest school for National Forest work. A considerable part of the work in lumbering and forest engineering is carried on in the nearby forests and in the camps and mills of nearby lumbering operations.

**REQUIREMENTS FOR ADMISSION.**

The completion of a four years’ preparatory or high school course is the standard for regular entrance to the Forest school in the university, as in the other regular courses of the university.

Students in high schools and preparatory schools who plan to enter the forest school should preferably include elementary biology, botany and zoology, English and mathematics in their training. Students intending to elect the course leading to the degree of forest engineer should preferably include English, physics, chemistry and four years of mathematics in their preparation. Candidates for the degree of bachelor of science either in forestry or forest engineering will be required to make up any deficiency in their preparatory training in English or mathematics.

Any person over 20 years of age, of good character, and who gives sufficient evidence of his ability to pursue the studies may enter as a special student.

**SHORT COURSES FOR FOREST RANGERS.**

A short course for forest rangers is offered during the first part of the second semester of each year. This course is provided in co-operation with the officials of the Forest Service and is open to men in the Service and to others who have had experience in forestry work, forestry engineering or lumbering. This course covers 14 weeks beginning about the first of January and closing in April. Instruction is given by members of the university faculty with special lectures by officers of the government Forest Service.
Forest School Students

FRESHMEN

Everett F. Butler ........................................ Montana
Charles Carlson ........................................ Montana
Martin Carlson ........................................ Minnesota
Floyd Eahart ........................................ Montana
Roy Edwards ........................................ Montana
Percy Fox ........................................ North Dakota
Harley Hartson ........................................ Montana
Harold Hill ........................................ Montana
Alden Jones ........................................ Montana
William G. Kane ......................................... New York
Claude McQuarrie ..................................... Montana
Ernest Prescott ......................................... Montana
Harry M. Ross ......................................... Montana
Fred W. Weyer ......................................... Idaho

SOPHOMORES

John Jay Ector ........................................ Montana
Henry Hayes ........................................ Montana
Lysle R. Hodson ........................................ Montana
W. D. Richardson ....................................... Ohio
L. W. Sanderson ........................................ Washington
F. K. Stewart ........................................ North Dakota
C. F. Vance ........................................ Washington
W. I. White ........................................ Montana
C. V. Wingett ........................................ Kansas

JUNIORS

Paul A. Bischoff ....................................... Ohio
James F. Brooks ....................................... Nebraska
Sam Cook ............................................... Oregon
Willard Jones ......................................... Montana
Hugh Kent ........................................ Illinois
Stillman Ross ......................................... Montana
Edward Simpkins ..................................... Montana
F. M. Schlegel ......................................... Ohio

SENIORS

Harold Lansing ........................................ Montana
Kenneth Wolfe ........................................ Montana

SPECIAL AND IRREGULAR

L. Blessing ........................................ Montana
P. L. Grundy ........................................ Montana
Grant Higgins ......................................... Montana
R. L. Inglebrigtsen .................................... Washington
G. A. Kain ........................................ Montana
A. King ........................................ Montana
A. E. Lister ........................................ Montana
Bruce Metlen ......................................... Montana
C. A. Nelson ......................................... Montana
Melville Woods ....................................... Montana
### COURSES IN FORESTRY

#### FRESHMAN YEAR

<table>
<thead>
<tr>
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<tr>
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<tr>
<td>Geology</td>
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| Elective— | |
| Grazing | F 91 2 |

#### SOPHOMORE YEAR

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| Elective— | |
| Biology | 3 |
| Physics | |
| Geology, Physiography | 3 |
| Chemistry | 3 |
| English or German | 3 |
| Mathematics | 3 |
| Grazing | F 93 2 |

#### JUNIOR YEAR

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<td>Forest Reconnaissance</td>
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<tr>
<td>Forest Policy</td>
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| Elective— | |
| Biology | 3 |
| Physics | 3 |
| Geology, Physiography | 3 |
| Chemistry | 3 |
| English or German | 3 |
| Mathematics | 3 |
| Grazing | F 93 2 |

#### SENIOR YEAR

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| Elective— | |
| Silvics, Review | 3 |
| Forest Geography | 3 |
| Physics | 3 |
| Forest Policy | 3 |
| Logging Engineering | F 36 3 |
| Grazing | F 95 2 |

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| Systematic Botany, Review | B 17 3 |
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| Logging Engineering | F 36 3 |
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**FRESHMAN YEAR**

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**SENIOR YEAR**

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<td>Improvement Construction</td>
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<td>Motive Powers</td>
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Old Montana

Take me back to old Montana,
   Where there's plenty room and air;
Where there's cottonwood an' pine trees;
   Bitter Root and prickly pear;
Where there ain't no pomp nor glitter,
   Where a shillin's called a "bit,"
Where at night the magpies twitter,
   Where the Injun fights were fit.

Take me where there ain't no subways,
   Nor no forty-story shacks;
Where they shy at automobiles,
   Dudes, plug hats an' three-rail tracks;
Where the old sun-tanned prospector,
   Dreams of wealth an' pans his dirt,
Where the sleepy night-herd puncher,
   Sings to steers and plies his quirt.

Take me back where the sage is plenty,
   Where there's rattlesnakes and ticks;
Where a stack of "whites" cost twenty,
   Where they don't sell gilded bricks;
Where the old Missouri river,
   An' the muddy Yellowstone,
Make green patches in the Bad Lands.
   Where old Sittin' Bull was known.

Take me where there's diamond hitches,
   Ropes an' brands an' cartridge belts;
Where the boys wear chaps for britches,
   Flannel shirts an' Stetson felts,
Land of alfalfa an' copper!
   Land of sapphire an' gold!
Take me back to dear Montana,
   Let me die there when I'm old!
New Methods of Making Topographic Surveys of Timbered Areas

By James H. Bonner† and Frank E. Bonner*

(NOTE: The following article appeared in the January 6th issue of "Engineering News" and the March issue of "The Timberman," and has been widely commented on by engineers as presenting something entirely new and valuable. Perry Baker, editor of the "Engineering News," in commenting on the article, said: "It is not very frequently that the editor can direct attention to new methods in surveying but the reader will find this article to describe some truly radical improvements in the field work of topographic surveying."—Kaimin Editor.)

The past few years have witnessed a remarkable change in methods used in the logging industry in the Pacific Northwest. It is only a few years ago that a man with a quarter section of timber land, a team of horses and limited capital could engage in the logging business. But times have changed: the close-in timber has been logged; keen competition has reduced prices, and the future logging operations of the large companies are planned out on a comprehensive scale for years to come. The old tote road is being supplanted by the logging railroad. The passing of the small-mill man is marked by the advent of the Logging Engineer, a profession unknown a few years back. Practically all of the companies doing railroad logging in the northwest now employ an engineer more or less continuously, who plans and directs the entire field operations.

Time was when a company in building a logging railroad followed

the general contour of the ground, with narrow roadways, steep grades, and insufficient drainage. But modern business efficiency no longer permits such methods; the logging companies are now doing on a small scale what our transcontinental railroads are undertaking—eliminat-

†Professor of Forest Engineering, Forest School, University of Montana.
*Chief of Geography, District No. 1, U. S. Forest Service.
ing sharp curves and reducing grades on the main lines. Such con-
struction increases first cost but the logging engineer no longer plans
on tearing up the steel in a few years when the area has been logged.
The grade is so constructed that the owner of a body of timber beyond
can afford to buy the road and haul his logs out over it in preference to
building another railroad. Also in special cases, owing to the present-
day demand for logged-over lands for farming purposes, there is a
chance of the road being used as a common carrier in years to come.

**ACCURATE MAP ESSENTIAL.**

The logging engineer's first demand in taking over a new job is for
an accurate topographic map of not only the area that his company
intends to log, but of all the adjacent territory. There is no need to
dwell on the necessity for an accurate contour map. It becomes the
working plan of the logging engineer on which he makes the locations
for railroads, spurs, flumes, chutes, roads, camps and cable systems.
The cruiser's maps, giving locations of streams and ridges, with occasion­
al elevations taken with the aneroid barometer, served their purpose
in their day, but modern business
requires more de­
tail. The topogra­
phy must be accu­
rate on the map,
the reports must
give a care ful
classification of all
timber, for each
species, as stand­
ing, d e a d a n d
down, timber suit­
able for piling,
poles and ties, with
an estimate of probable defects; also soil classification reports, condi­
tions of undergrowth and mineral indications.

The surveys for topographic maps for logging operations are made
in various ways. The method to be used is determined by the lay of
the land and the density of the forest growth. Until a year or two ago
the custom was to make all such surveys by the Aneroid method, which
was simply a refinement of the methods used by timber cruisers. Ele­
nations were determined by primary leveling along certain lines
selected as base lines. If the area had been previously covered by the
survey of the U. S. General Land Office, it was customary to establish
the base along section lines; while in unsurveyed territory irregular
traverses were run along roads, trails or ridges, the work usually being
done by transit and stadia and the elevation computed at fixed inter­
vals. From these base lines parallel "strips" were run.

The strip crew usually consists of a compassman and an estimator.
The compassman ran a rough line by a box compass and paced the dis­
tances. Also he carried an aneroid barometer which he set with a sta-
tionary camp barograph in the morning and sketched the contours each side of the line on his map. It was also necessary to record the time at which the aneroid readings were taken in order to make the corrections for the fluctuations of the instrument during the day. The aneroid, while a handy instrument for taking rough elevations, is too eccentric to be relied upon to do accurate work, as any engineer is aware who has used one in mountainous regions subject to frequent and sudden atmospheric changes. As the working aneroid goes through the changing atmospheric conditions during the day, it is necessary to correct the readings in proportion to the fluctuations of the camp biograph.

After the day's field work is completed and the aneroid reading corrected, follows the difficult work of adjusting contours to form the finished map. If the topographer has been conscientious and is skilled at his work, he has gathered a wealth of topographic detail which is all to be lost and wasted while his contours are put through the "juggling" process. The very lack of preciseness and knowledge that the map must be adjusted greatly discourages careful and conscientious sketching in the field.

It is very evident that the map cannot be accurate except in a general way, all topography is approximately correct but would hardly answer as a map on which to make the paper location for a railroad or a flume. The cost of making surveys using the method outlined above is from 5c to 35c per acre.

Such was the condition when the engineers of District No. 1 of the
Forest Service commenced their series of experiments to develop a more efficient method of topographic surveying. Ordinary topographic survey practice was not applicable. Heavy timber and dense brush and undergrowth prevented efficient use of plane table method, as it was necessary to get beneath the cover of the forest in order to get the topographic detail required. Also the operations must necessarily be combined and co-ordinated with the timber estimating and appraisal work, and could not therefore follow the methods which would be adopted for the production of a topographic map alone. Low cost was an important consideration.

The first tests were made with the ordinary Abney level or clinometer familiar to all engineers. While the results were satisfactory, it was a cumbersome method in which the field men were compelled to constantly refer to reduction tables in order to ascertain their true horizontal position. The instruments as then made, were not constructed for such work and were almost impossible to keep in adjustment. By constantly experimenting and making improvements, a new Abney level was developed that is now manufactured expressly for work of this character and simplified methods introducing greater speed and accuracy were worked out.

THE NEW ABNEY LEVEL AND ITS USE.

The improved Abney level, as illustrated in Fig. 1, is only slightly larger than the old Abney, and its cost is about the same. The arc is made larger and graduated to read directly the difference in elevation.
per chain (66 ft.) of horizontal distance; a prism has been substituted for the German silver reflector; the bubble tube is made longer and with adjustment devices similar to those on the bubble tube of a transit. Also the bubble tube support is attached rigidly to the indicator arm of the arc, thus eliminating the inevitable lost motion between these two parts existing in all old-style Abneys. The bubble tube is arranged to allow adjustment that will eliminate refraction which made the old-style instruments so unreliable in measuring steep slopes. A semi-circular lens placed in the fore end of the eye piece tube, as in the Locke level, magnifies the movement of the bubble so as to greatly facilitate accurate sighting. The various changes introduced have so improved the instrument and the results of its intelligent operation have proved so surprising, that the new Abney will doubtless meet with favor among the entire engineering profession, and its scope of use in field work of all kinds greatly extended.

Aside from the special graduation shown in Fig. 1, which is applicable to all topographic work, plates with the usual degree and per cent graduations are furnished and also a special graduation to give directly horizontal distance from slope chaining. This graduation has found much popularity in cadastral surveys.

**TOPOGRAPHIC SURVEYS OF TIMBER LANDS.**

There was some objection at first to the Abney method on account of the necessity of taping the slope distances, but two years of use have proved that this work can be done with practically the same convenience and time as pacing.

The unit of measurement adopted was the chain of 66 feet for the reason that a large portion of the work is the retracement of land survey lines recorded in that unit, and also for convenience in timber estimating. Obviously a definite horizontal unit is necessary for operation without the use of tables and after thorough trial it was found that a distance of 2 chains was most convenient for rough country covered with heavy timber. A special 2½ chain tape has therefore been designed for use with the Abney method, the tape proper consisting of 2 chain lengths divided into links, with an additional half chain "trailer." The trailer is graduated in order to allow the proper slope measurement for the excess of the hypotenuse of a triangle, the base of which is 2 chains. For example, suppose the crew to be ascending a slope as indicated in Fig. 2. The topographer reads from the arc that the rise per chain on that slope is 38 feet. The rear chainman, (usually the timber estimator) then looks for the 38 etched beyond the 2-chain tag on the tape, which in this case would be 20.42 feet beyond. By stretching the tape tight, the point "b" is then located and is known to be 2 chains distant and 2x38 feet higher than "a." The topographer then sketches his contours, taking sideshots in order to locate the distance between contours, and "side walking" if necessary.

A strip crew of two men will cover about two miles of line a day. Frequently the brush and undergrowth is so thick that sights two chains long are impossible, requiring the use of a one-chain distance or sight by sound. Remarkably good closures have been obtained in
many cases employing the latter method. In dense and dark forests it is usually necessary for the estimator to carry a small mirror in order that the topographer may sight on the flash. In this way sights are obtained through brush that seems almost impenetrable to the eye.

The general method followed is similar to that used in the aneroid method. Primary control fixing the geographic position of the area both horizontally and vertically on the face of the earth is obtained by precise connection to adjacent primary stations of the United States Geological Survey. Secondary control lines are run around a block of sections or topographic unit, stakes or posters on trees being left at periodic intervals from which the strip surveys may be initiated or closed. The Abney instrument is used for the control as well as the strips, it being found to be just about as accurate as direct leveling, and much faster. The work on control lines is of course much more carefully executed than in the strip lines, two Abneys being used.

The control system is so planned that the strip surveys will not be run more than two miles without closing upon a control line. The strip surveys are run along parallel lines usually an eighth or quarter mile apart, depending upon the density of the timber and the degree of detail required.

It is customary to combine the mapping with either the timber estimating or the soil classification work, thus making the one survey serve two purposes and reduce the cost of each. The crew consists of the topographer who keeps his direction with a staff compass, operates the Abney and sketches the topography. The estimator "snubs" the rear end of the tape, making the proper allowance for slope, and estimates the timber on a strip 33 feet wide on each side of the line. Experience has shown that the time lost by the estimator in holding the rear end of the tape to be practically negligible.

The strips are usually belts 10 chains wide, the line being run along the center line and topography sketched for 5 chains on either side. It will be noticed that the method is not a system of determining the elevation of points along a profile line, and interpolating the intermediate contours, such as the aneroid method, but a number of points are located through which each contour must pass, by taking side shots at right angles to the general direction of the contours, as indicated by the dotted lines and arrows on Fig. 3. Although the skeleton of the topography is thus accurately obtained mechanically, the sketching or filling in of the topographic detail depends entirely upon the skill and judgment of the topographer, which may only be attained through considerable experience and some amount of natural talent often called "topographic sense."

As the price of stumpage increases, the accuracy and detail demanded on topographic maps increase. Some of the larger companies now have their strips run at 2½ chain intervals, estimating each tree separately and trusting nothing to averages.

ACCURACY OF METHOD—ERROR OF CLOSURE.

The results attained by those who have been working with the Abney method are truly marvelous. On one project comprising 54,000 acres in the Coeur d'Alene National Forest in northern Idaho, completed
during the 1915 season, 64 miles of control line were run with an average elevation closure of one foot to the mile. The area mapped was very rough and mountainous and the timber cover consisted largely of heavy stands of Idaho white pine accompanied by heavy undergrowth and dense brush. The greater part of the area had been previously covered by both the General Land Office public survey and by the Geological Survey small scale topographic quadrangles, so that no primary control had to be executed. On this same project over 500 miles of strip surveys were run with an average elevation closure of 10 feet to the mile. The minimum error on such lines was one foot to the mile, while the maximum allowed was 30 feet.

The errors of closure for alignment and distance on the strip surveys each averaged ½ chain to the mile. Mapping was done on a four-inch to the mile scale, using a 50 foot contour interval. It is readily apparent, therefore, that the errors of closure resulting can be readily adjusted so as to be almost negligible on the scale of the map. The cost of the work, including the control, mapping, timber estimating, etc., was approximately 12¢ an acre. The results of this project furnish an average example of what is being accomplished on a large amount of similar work. In less rugged and more open timber, as in the yellow pine and lodge pole stands for example, closing errors and costs are more favorable.

The students in the forest school have participated in the development of the new instrument. The preliminary trials were made under
the direction of Mr. R. V. Reynolds, in charge of Entry Surveys, Washington, D. C., assisted by officers of District No. 1, U. S. Forest Service, and by forestry students. During the past three months the students in forest reconnaissance made an intensive survey of the campus of the university using the new method. As will be noticed from the map, this area is somewhat rough and partially covered by a heavy stand of timber, and presents on a small scale all the difficulties that would be encountered in the making of topographic surveys in the Rocky Mountain region.

In the making of this survey, control was carried to the southwest corner of section 26 by Locke level from a U. S. G. S. bench mark. Secondary control was established along the west line of section 26 by transit and stadia. The strips were then run at right angles at intervals of 10 chains as indicated by the arrows and dotted lines on the map.

THE MOUNTAIN AND THE LAKE

I know a mountain thrilling to the stars,
Peerless and pure, and pinnacled with snow;
Glimpsing the golden dawn o'er coral bars,
Flaunting the vanisht sunset's garnet glow;
Proudly patrician, passionless, serene;
Soaring in silveryed steeps where cloud-surfs break;
Virgin and vestal—Oh, a very Queen!
And at her feet there dreams a quiet lake.

My lake adores my mountain—well I know,
For I have watched it from its dawn-dream start,
Stillling its mirror to her splendid snow,
Framing her image in its trembling heart;
Glassing her graciousness of greening wood,
Kissing her throne, melodiously mad,
Thrilling responsive to her every mood,
Gloomed with her sadness, gay when she is glad.

My lake has dreamed and loved since time was born;
Will love and dream till time shall cease to be;
Gazing to Her in worship half forlorn,
Who looks towards the stars and will not see—
My peerless mountain, splendid in her scorn . . .
Alas! Poor little lake! Alas! Poor me!
—Robert Service.
Fires
By BRISTOW ADAMS

The District Forester Speaks:

I wish I were out with the fellows—
   Just my luck to be stuck here in town;
But I've got to sit tight when I'd heap rather fight
   To help keep these brush blazes down.
I'm sick of this end of the business.
The ring of the querulous phone,—
The telegrams, too, of flames breaking anew
   While I have to stand it alone,
And I'll own
   It's hell to be watching alone.

There's Bill—he's gone out with the pack train,
   And Jim—he's to rustle the grub
For the men on the line, and he's doing it fine
   While I'm sitting here like a dub;
The fellows are working like demons,
They're scorched and they're blistered—no less,
   While I stay and chafe and am damnably safe
When I'd like to mix up in the mess;
Well, I guess!
   That the buck-brush ablaze is a mess!

In a swivel chair—well, it's the limit—
   With the rest in the thick of the fight
With their lungs all a-choke with the dust and the smoke,
   And sweat in their eyes day and night;
But I've got to look out for the labor—
   This calling for troops makes me sick;
There's none seems to know if the troops ought to go;
Neither begging nor blarney nor kick
   Brings 'em quick,
So it's no use to blarney or kick.

Out there are my Supers and Rangers,
   With lumberjacks, men from the mills.
From fields and from slums, hoboes, tie hacks, and nums,
   And ranchers who know all the hills;
While I'm here with no smoke in my nostrils,
   I am here with no scorch on my cheek,
When I'd rather be there with singed eye-brows and hair
   Than stuck in here week after week.
Hear me speak!
I'll be bughouse inside of a week:
DISTRICT ONE'S EMERGENCY WAREHOUSES

By J. F. Brooks, '17, Forest School.

Results of the 1914 fire season impressed upon District One more clearly than ever the need for preparedness in the fire game. The experiences of this and preceding seasons revealed several defects in the equipment for protection. The most serious of these were that the fire-fighting equipment was scattered over the District with little regard for actual need; the equipment was not standard in type or quality, the means provided for furnishing equipment to Forests in cases of emergency were very inadequate.

The unequal distribution of equipment was probably due to the fact that there was no standard fixing the amount to which each forest was entitled. According to the standard recently set each Forest should be equipped in the ratio of complete equipment for 80 men to each $1,000 of annual fire patrol money allotted. It has been found necessary to supplement this standard, in the case of eastern forests, by adding a certain amount of one man equipment for per diem guards. Standards which determine what constitutes equipment for 80 men have been set so that the distribution can be made exactly and on an equitable basis. Few of the Forests are now up to standard in this matter but will be made so as rapidly as funds become available.

Another phase of the distribution question arises in noting, on some of the forests, the lack of balance in stocks of tools now on hand. For instance, one Forest now has mattocks enough for about 1,000 men but is short of certain equipment which is found in excess on some other Forests, where a shortage of mattocks exists. This spring, so far as possible, these deficiencies and surpluses of equipment will be done away with by exchanges among Forests. The question arises, however, whether it is good business to gather up equipment from remote places and redistribute it on account of excessive handling and shipping cost. Where sufficient equipment at one point may be easily or cheaply forwarded to the place where it is needed, a redistribution will be warranted.

A great variety, over the District, of type and quality of equipment is due to the fact that in the past there has been little regulation of purchase. Each Forest has bought its own equipment independently and the only standard articles obtained were those furnished by the Ogden Supply Depot. In many cases buying has been done very hurriedly on account of emergency need, and the Forest Officers have been compelled to take what they could get at the local dealer's price.

Prior to the 1915 season, there was practically no centrally located supply of emergency fire-fighting equipment made up for speedy shipment. To remedy this serious defect the office of "Operation" of District One worked out the warehouse plan. Its functions have since been enlarged to take care of other defects in organization of equipment.

This winter a list of all the equipment in the District has been compiled and before the coming fire season a redistribution will be made appropriating it so far as is practicable with a view of bringing each Forest up to standard. As stated before, new tools will be purchased when funds are available and it is expected that in a short time every Forest in the District will have its full quota. Hereafter each emergency outfit sent out will be complete for a certain number of men. The annual replacement and additions to equipment of Forests will be made in many cases by simply leaving, on the Forest, the
were thus retained on the Forest, the warehouse stocks will be kept up by 
replacement. However, it will be the policy that at least all non-expendable 
equipment will be returned to the warehouse.

The method of centralized purchase of equipment is a big improvement over 
the method previously followed for the two reasons of standardization of 
equipment and economy. The District Forester receives bids and contracts 
for quantities large enough to supply the entire District for one year. This 
insures uniformity in type and quality and also effects a great saving in cost. 
After allowing for the cost of distribution, over the District, there is still a net 
saving of nearly 100 per cent on the prices usually paid.

It is important to note in connection with the buying of equipment that 
there is no duplication of the purpose of the Ogden Supply Depot; in fact, the 
Forester's letter authorizing the establishment of the warehouse plan in 
District One positively forbids any attempt at such duplication. All sup­ 
plies and equipment obtainable at Ogden will be ordered as usual. The ware­ 
houses in reality are distributing points for District One in the same way that 
the Ogden Depot is for the Forest Service, except for articles which can be 
requisitioned from Ogden.

The prime object of this plan, however, is to give the District Forester an 
advisable method of aiding the Forests when emergencies arise. The locations 
of these warehouses and the number of men that they can equip are as fol­
lows: Missoula, 900; Kalispell, 500; Spokane, 500. The term equipment 
includes the following: Riding and pack outfits, complete kitchen and mess 
outfits, tentage, tools, tool sharpening outfits, emergency telephone wire, port­
able telephones and medicine chests. Everything is put up in large quantities, 
the idea being that only in exceptional cases will outfits for less than 50 men

be sent out.

The warehouses are located in their respective cities, chiefly with regard 
to the railroad service. All have switching connections with the railroad. 
During the fire season men are stationed at the warehouses to keep things in 
order and send out equipment. The slogan “Minutes Count” is well exempli­
ified by the manner in which the system is handled, everything being so 
arranged that shipments can be made speedily and without difficulty.

The method of ordering emergency equipment is very simple—if by mail a 
special fire form is used, if by telegraph it is sufficient to say: “Send equip­
ment for so-many men to such-and-such a place.” Receipts are required from 
the Forest Officers receiving the equipment. When anything is sent out from 
the warehouse it is charged to the Forest to which it is sent, and credited to 
the warehouse and when returned is credited to the forest and charged to 
the warehouse. This makes it possible, at all times, to tell just what is on 
hand in the warehouse. The simplicity of ordering and keeping of the books 
is a feature of the warehouse system which adds to its popularity.

The Missoula Warehouse is the largest of three, and being specially designed 
for the use to which it is put, is particularly interesting. It is a frame build­
ing fifty feet long, twenty feet wide, and ten feet high (to the eaves). A 
suspended platform, as shown in the cut, extends the full length of the build­
ing. One side is made up into compartments of which there are twenty-one, 
also shown in the cut. On the other side there is a shelf four and a half feet 
wide which extends the full length of the building except for an opening six 
feet wide for a door. Each compartment is numbered and each is the place
for a certain kind of article. A hallway runs down the center of the building and there is a space at one end for assembling and packing equipment.

EQUIPMENT EFFICIENCY.

The kitchen and mess equipment is put up together in outfits for fifty men crews. Everything except the grates, reflectors, dish-pan and frying-pan are packed in one large wash-boiler container, which is divided into three compartments, the one in the center being considerably smaller than the other two. This center one contains such articles as rolling-pin, egg-beater, nutmeg grater, butcher's steel, knives, forks, spoons and other kitchen accessories. One of the end compartments contains a nesting set of kettles and the other one the mess equipment, such as plates, soup bowls, etc. Each of these fifty-man outfits weighs 132 pounds, and is in such a form that it makes a good side-pack. This makes it possible for two horses to pack equipment which formerly required six or seven. In these outfits there is absolutely no enamel-
F O R E S T R Y  K A I M I N

ware used—everything, including tableware, is rust-proof pressed tin or retinned ware.

The stoves now on hand, which are best adapted to packing on horses, are made of sheet iron, and the oven telescopes into the stove proper making it of size suitable for a top-pack. There are also a number of much heavier camp ranges which may be used where wagon or railroad transportation is possible. The stovepipe comes in telescope form.

Complete pack outfits are stored in the warehouse in such form that they are ready for immediate shipment. Each of these includes a pack-saddle, saddle blanket, saddle pad, lash, cinch ropes and cinch, all wrapped up in the manta, or pack cover. Halter, hobbles, muzzles and bells will be included if requested. The pack saddles are of the Decker type, this being a much more satisfactory saddle than the cross-tree. A number of good riding saddles are also kept on hand.

The 20-gallon canvas water bags for packing on horses are also worthy of note. One of these makes a good side-pack, making it possible for one horse to carry forty gallons of water. These bags each have a small push-button faucet. Five-gallon water bags with back pack straps are also available. Both kinds are so devised that the top may be opened clear across and then closed, greatly facilitating the process of filling and making them easier to clean.

The standard bed includes two blankets and a half of a shelter tent. The latter is 7½ feet long by 5½ feet wide and may be used as a tarp or put with another half and used as a tent which is large enough to accommodate two men, and unlike the army shelter tents, has closed ends. This one-man bed is done up in a compact roll and equipped with pack straps which together weigh 11 pounds. These beds are used to equip emergency fire-fighters where the men are not supplied personally. They are charged against the men using them and are returned to the warehouse after use.

The medicine kits are small but complete, containing enough kinds of splints, bandages, antisepsics, etc., to take care of almost any first-aid need of a fire crew. Complete instructions are also included. These kits are for large crews only. A small medicine kit for one or two men is being made.

A gasoline engine and pump mounted on a frame for packing is now being designed. The pump idea has been tried and is known to be practical, so it is now just a matter of working out the mechanical detail for light weight and high pressure. A light water-cooled engine will be used and the outfit will be so light and compact that one horse can pack it.

These improved forms of equipment help to show the progress which has been made in the handling of the fire problem. There is chance for introduction of new ideas and a few years will find that many changes in equipment and methods have been made.

Attention has not been confined to the warehouse, however. An analysis of the present situation has proved that the first line of defence, or "Smoke Chaser" department is of more importance than the third line of defence, of which the warehouse system is a part, and the former, until perfected, should receive the greatest attention.

An emergency outfit for smoke-chasers is now being devised. It includes a shovel, axe, mattock, rations for three days, one or two blankets, as the individual using it desires, and a small first-aid medicine kit. The tools are light
but serviceable enough for emergency use. The rations are concentrated foods and the dishes are of aluminum. The whole outfit weighs only thirty pounds.

In conclusion it should be stated that not everything in the warehouse has been described, but rather only those things which are of most interest on account of their recent development. It may safely be said that practically everything listed in the fire manual is available and in addition many useful and convenient articles not mentioned there.

The warehouse plan as developed by District One has already proven itself a success, and is being adopted by the other Districts of the Forest Service. It is the last word in fire protection and much credit is due to officials of District One for developing the idea as they have.

WHERE THE WEST BEGINS

(Published in the 1915 Kaimin—Republished by request)

Out where the sun is a little brighter,
Where the snows that fall are a little whiter,
Where the bonds of home are a wee bit tighter—
That's where the West begins.

Out where the skies are a trifle bluer,
Out where friendship's a little truer—
That's where the West begins.

Out where the handclasp's a little stronger,
Out where the smile dwells a little longer—
That's where the West begins.

Out where the world is in the making,
Where fewer hearts with despair are aching—
That's where the West begins.

Where there's laughter in every streamlet flowing,
Where there's more of reaping and less of sowing,
That's where the West begins.

Where there's more of singing and less of sighing,
Where there's more of giving and less of buying,
And a man makes friends without half trying—
That's where the West begins.
THE CALL OF THE WILD

By Robert Service

Have you gazed on naked grandeur where there's nothing else to gaze on,
Set pieces and drop curtain scenes galore.
Big mountains heaved to heaven, which the blinding sunsets blazon,
Black canyons where the rapids rip and roar?
Have you swept the visioned valley with the green stream streaking through it,
Search the Vastness for a something you have lost?
Have you strung your soul to silence? Then for God's sake go and do it;
Hear the challenge, learn the lesson, pay the cost.

Have you wandered in the wilderness, the sage brush desolation,
The bunch-grass levels where the cattle graze?
Have you whistled bits of ragtime at the end of all creation,
And learned to know the desert's little ways?
Have you camped upon the foothills, have you galloped o'er the ranges,
Have you roamed the arid sun-lands through and through?
Have you chummed up with the mesa, do you know its moods and changes?
Then listen to the Wild—it's calling you.

Have you known the Great White Silence, not a snow gemmed twig aquiver?
(Eternal truths that shame our soothing lies).
Have you broken trail on snowshoes, mushed your huskies up the river,
Dared the unknown, led the way and clutched the prize?
Have you marked the map's void spaces, mingled with the mongrel races,
Felt the savage strength of brute in every thew?
And though grim as hell the worst is, you can round it off with curses?
Then harken to the Wild—it's wanting you.

Have you suffered, starved and triumphed, groveled down, yet grasped at glory,
Grown bigger in the bigness of the whole?
"Done things" just for the doing, letting babblers tell the story,
Seeing through the nice veneer the naked soul?
Have you seen God in His splendors, heard the text that nature renders?
(You'll never hear it in the family pew).
The simple things, the true things, the silent men who do things—
Then listen to the Wild—it's calling you.

They have cradled you in custom, they have primed you with their preaching,
They have soaked you in convention through and through;
They have put you in a showcase; you're a credit to their teaching—
But can't you hear the Wild—it's calling you.
Let us probe the silent places, let us seek what luck betide us;
Let us journey to a lonely land I know.
There's a whisper on the night wind, there's a star agleam to guide us,
And the Wild is calling, calling . . . . . . let us go.
Frank Bonner, Chief of Office of Geography
District No. 1, U. S. F. S.
Missoula, Montana.
One of the most interesting and important branches of the Forest Service is the Office of Geography. In this department is centralized all work of a civil engineering character in District One, with exception of that involved in the handling of hydro-electric power applications. There are included in the 26 National Forests comprising the District, 27,000,000 acres located in the states of Idaho, Montana, North Dakota, South Dakota and Washington. Naturally, in the administration and development of this vast area, there arise numerous and varied technical engineering problems, requiring the service of considerable expert force, consisting of from 25 to 30 engineers. This permanent force is of course greatly augmented during the summer season by the employment of instrument men, level men, and minor assistants on field parties, together with foremen, teamsters, laborers, etc., comprising the construction forces.

The department is divided into four general divisions: Construction, Survey, Topographic and Drafting. In the Construction division is handled the survey, design and construction of highways, bridges and other improvements contributing to the development of the Forests. The major part of the work of the Survey division consists of the execution of the final proof surveys of homesteads within the Forests; subdivider and all other property line surveys are supervised by this division also. Under the Topographic division is supervised all surveys and field investigations involving the preparation of topographic maps. In the Drafting division is handled the drafting work on maps and plans necessary in connection with the returns of the field surveys performed by the other divisions. Also the general drafting work for other branches and field offices, preparation of general maps, alienation and statistical records, map printing and photography.

A great deal of the work of the department is along new and original lines and much has been developed by the District One organization that has been adopted as the approved practice throughout the Service.
By their very nature, the great tracts included in the National Forests comprise the roughest and most inaccessible regions in the Northwest. The matter of providing adequate highway systems, that will close across the mountain barriers the gaps in the existing trunk highway systems and thus permit not only through travel, but also commercial relations between communities separated hitherto by the mountains, is of primary importance.

Secondly, it is essential that highway systems be constructed through the Forests to allow their proper administration and protection, also to promote the immediate commercial and recreational use and development which the vast resources of the National Forests should be bearing in the upbuilding of the commonwealths to which they are tributary.

The only money available at present to the Forest Service for road construction consists of what is known as the ten per cent fund. This is made up by the return to the Service of ten per cent of the receipts derived from the sale of timber, grazing fees, etc. The amount of money available from this source is of course entirely inadequate to make much progress on the comprehensive system of highways needed. It is estimated that to properly improve the trunk highways serving the National Forests of District One will require not less than $11,000,000. Several bills are now pending in Congress contemplating the appropriation of sums approximating those needed.

Mountain road construction is particularly difficult and expensive. Usually the route follows down a rocky canyon or ascends along steep hillsides and precipitous bluffs to reach a high pass or summit. The standards on such work hitherto throughout the greater part of western America have been far below those which the best engineering judgment and considerations of ultimate economy would commend. This has been chiefly due to the lack of properly made plans and adequate engineering advice and supervision. Although the funds now available to the Forest Service are small, a start is being made in the right direction. The greater
part of the funds is being concentrated on a few projects each year and expended under competent supervision to obtain economical and high standard results. During 1914 and 1915 a project embracing 26 miles between the Bitter Root and Big Hole Valleys was completed in co-operation with Ravalli and Beaverhead counties. This road ascends the Continental Divide and involved much heavy construction. The total cost was in the neighborhood of $55,000. There was also completed in 1915 the road down the Kootenai Canyon in Lincoln county between the towns of Libby and Troy, which connects the northwestern part of the state with the highway systems of northern Idaho. Certain sections of this road required exceedingly heavy solid rock excavation costing at the rate of $10,000 to $12,000 a mile.

Other highway projects of considerable importance completed in 1915 were: The North Fork of the Flathead in Montana, and the Priest River and Meadow Creek projects in Idaho. The North Fork of the Flathead River project follows along the west boundary of Glacier Park and opened up a country scenically magnificent. This road has cost approximately $50,000. In 1916, one of the principal projects in Montana will be the construction in co-operation with Cascade and Meagher counties of eight miles of road across the Little Belt Mountains which will complete the through highway between White Sulphur Springs and Great Falls. The estimated cost of this piece of work is $46,000. All drainage structures will be of concrete and steel and the road will be of very high standards throughout. In Idaho will be undertaken, under the supervision of the Forest Service highway department in co-operation with the State Highway Department of Idaho, the construction of 12 miles in the Fourth of July Canyon between Wallace and Spokane and which forms a link of the main transcontinental route between New York and Seattle. This project will involve high-class construction and will cost about $70,000.

In the work being undertaken by the Service, construction programs are planned several years in advance, thus allowing complete location surveys and plans to be made during the year previous to construction. So far the work has been carried on both by the contract and direct supervision plans. With the development of efficient construction organization it has been found that results from the
The latter system have proved fully as economical as contract work and more satisfactory in several ways from the standpoint of quality of work. Owing to absence of cost data on mountain highway construction work in this region, it has been almost impossible until the past year or so to prepare accurate estimates. From the detailed cost accounting systems which have been applied to all work since 1913, complete data of this character is now available so that costs may be estimated easily within several per cent. Engineering work including the preliminary and location surveys and construction engineering is costing between five and six per cent of the total cost of the improvements.

\[
A = \frac{1}{2} (W \times S + W' \times S) \\
V = \frac{1}{2} (A + A') \times \text{length}
\]

Forest Service Standard Highway Cross-Section.

“‘He’s a nervy, wiry divil with his notebook an’ his livil, 
An’ he doesn’t seem to know the name av Fear, 
He’s a sort av scout av Progress, on the pay roll as a Civil— 
Though he ain’t so awful civil, if you say it on the livil— 
On the pay roll as a Civil Engineer!’”
Under the Act of June 11, 1906, permitting the entry of Agricultural homesteads within National Forests, provision was made for allowing lands not covered by the regular public land surveys to be taken up by metes and bounds description. A rough survey is made of such homesteads by the local Ranger, which serves as a basis for the original entry of such lands. Later, however, before final proof can be offered and patent issued, a very precise survey must be made of the tract under instructions from the Surveyor General and conformable to the regulations of the General Land Office, governing other surveys forming a part of the public land system. Such surveys are frequently very complicated and require execution by engineers skilled in such work.

Previous to 1913, the final surveys were made by expert surveyors accredited by the Surveyor General and the expense of survey borne by the homesteader. In 1913, however, Congress granted authority and appropriated funds to the Forest Service to perform this work. A corps of expert land surveyors was immediately organized and has been continuously employed since. During the 1915 season, a total of 188 surveys were completed by the five field parties under the direction of the office. Through the operations of the past three years, there has been completed a total of 429 surveys, but at the present time, there are still more than 800 awaiting action.

The detailed procedure employed in the performance of entry surveys embraces many interesting points of precise surveying practice. On each survey, it is required that two independent observations for true meridian be obtained. The various methods employed include polaris at elongation, polaris at hour angle, sun with solar apparatus and direct solar. In most cases the first mentioned method is considered preferable to the others on account of its accuracy and elimination of computation. The minimum closing error allowable on these surveys is one in 640, but as a matter of fact, most closures are far smaller, the average for the 1915 season being one in 4,000.
The topographic division of the office of Geography has direct supervision over all mapping work carried on in the District. It has been the aim in all of this work to obtain the very best maps possible for the money expended whether it be a small intensive area mapped on a scale of 8 inches to the mile or a drainage map on a scale of one-half inch to the mile covering an entire Forest. The major part of the mapping work is done on a scale of 4 inches to the mile with detailed topography.

The projects are widely scattered since the work is performed for the offices of Lands, Silviculture, Grazing and Planting, and the nature of their work being entirely different, it seldom happens that more than one project is carried on in the same locality. The projects vary in size from 50,000 to 100,000 acres—100,000 acres being the maximum for the average crew.

The work of supervising and looking after many details of this work, together with many other small projects carried on by the various Forests in the District occupies the time of the men in this division.

The mapping work is carried on by three methods, namely, Compass triangulation and sketching, plane tables, and compass, chain and Abney stripping—the method used depending upon the accuracy desired and the money available. All work, no matter of how rough a character, is controlled as to geographic position and elevation by the men in charge, either from Geological Survey stations or from stations established by expanding of their systems.

To date, approximately three-quarters of a million acres have been mapped on a scale of 4 inches to the mile by the Abney method alone. This method being the one principally used, and by the end of the coming season the total will be over one million acres.
Daylight Observations on Polaris

Although daylight observations on Polaris have been used for many years (records show as early as 1887) very few engineers have considered it practicable for regular surveying work. However, the engineers surveying homestead entries in District No. 1 have found it an advantage to be able to make daylight observations on Polaris and all agree that it is thoroughly practicable. While these observations are made with the greatest success between daylight and eight a.m., and from the time the sun sets until dark, results have been obtained as early as 1:35 p.m.

In order to determine the approximate position of the star, it is necessary to have a meridian located sufficiently accurate to bring the star within the field of vision. This can be determined either by the solar or the needle. The position of the star in the heavens can be located from the following table:

**TO FIND POLARIS BY DAYLIGHT.**

<table>
<thead>
<tr>
<th>Hour Angle of Polaris</th>
<th>Approximate Use Suitable Interpolations</th>
<th>Azimuth Setting</th>
<th>Altitude Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0 or 12.0</td>
<td>00'</td>
<td>NE or NW depending upon position of Polaris</td>
<td>Latitude Plus or Minus the Tabulated Quantities</td>
</tr>
<tr>
<td>0.5 or 11.5</td>
<td>30'</td>
<td>E. or W. of Meridian</td>
<td>1° 08'</td>
</tr>
<tr>
<td>1.0 or 11.0</td>
<td>45'</td>
<td></td>
<td>1° 07'</td>
</tr>
<tr>
<td>1.5 or 10.5</td>
<td>60'</td>
<td></td>
<td>1° 06'</td>
</tr>
<tr>
<td>2.0 or 10.0</td>
<td>75'</td>
<td></td>
<td>1° 05'</td>
</tr>
<tr>
<td>2.5 or 9.5</td>
<td>90'</td>
<td></td>
<td>1° 04'</td>
</tr>
<tr>
<td>3.0 or 9.0</td>
<td>105'</td>
<td></td>
<td>1° 03'</td>
</tr>
<tr>
<td>3.5 or 9.0°</td>
<td>120'</td>
<td></td>
<td>1° 02'</td>
</tr>
<tr>
<td>4.0 or 8.0</td>
<td>135'</td>
<td></td>
<td>1° 01'</td>
</tr>
<tr>
<td>4.5 or 7.5</td>
<td>150'</td>
<td></td>
<td>1° 00'</td>
</tr>
<tr>
<td>5.0 or 7.0</td>
<td>165'</td>
<td></td>
<td>1° 00'</td>
</tr>
<tr>
<td>5.5 or 6.5</td>
<td>180'</td>
<td></td>
<td>1° 00'</td>
</tr>
<tr>
<td>6.0 hours</td>
<td></td>
<td></td>
<td>1° 00'</td>
</tr>
</tbody>
</table>

With the aid of the tables, the procedure would be as follows:

It is desired to make an observation on March 15, 1915, at 4:30 p.m., local mean time, the Latitude is 45° north. From the ephemeris, the upper culmination of Polaris on March 15 is 2:00 p.m., therefore, the hour angle to use with the table is then 2 ½ hours, or the time which has elapsed since the upper culmination occurred. From the tables opposite 2 ½ hours, it is seen that 57 minutes have to be set off to the west of the approximate meridian on the horizontal limb and that 55 minutes are to be added to the Latitude, which would make 45° 55', the angle set off on the vertical arc. After setting these angles off on the proper arcs, the star should appear in the field of vision as a small white dot. If all angles are laid off correctly, the observer need not be afraid of having the wrong star, as no star of equal magnitude is in the imme-
diate vicinity of polaris. In making an observation of this kind, there are a few things which should be borne in mind.

1. A slight haziness hardly apparent to the naked eye is sufficient to conceal the star; therefore, it is useless to attempt the observation except on absolutely clear days.

2. It is necessary to have the telescope in exact focus for celestial objects. This can be obtained by focusing on an object several miles distant.

3. The sun shade should always be attached, and a focusing cloth similar to that used with a camera can be used to advantage in shutting out light from the rear. After the star has been located and the line of sight marked on the ground, the computation of the azimuth is the same as for any hour angle observation. To shorten the computation, the following simplified method may be used:

"If the star when observed is west of the meridian, the corrected time of upper culmination for the civil date of observation is subtracted from the local mean time of observation.

"If the star when observed is east of the meridian, the local mean time of the observation is subtracted from the corrected time of the next upper culmination succeeding the observation." The result in either case is the exact hour angle of polaris.

The Ephemeris issued by the General Land Office, which can be obtained from the Government Printing Office at Washington, D. C., tabulates the Greenwich mean time of upper culmination of polaris for every day in the year and also the table of the azimuth of polaris at elongation, and for any hour angle. Therefore, when the hour angle of the observation has been computed, it is an easy matter to compute the azimuth by means of these tables. Care should be used not to take the observation on polaris when the star is at or near culmination, as the star appears to be moving rapidly at these points and a small error in time will make a larger error in angle than it will when the star is nearer elongation.

STAKING SIMPLE CURVES BY OFFSET METHOD.

In addition to staking a simple curve by deflection angles, the following method of offsets may be used, the results being close enough for all practical purposes.

We have O = offset distance required.

\[ d = \text{fraction of distance P.C. or P.T. to P.I.} \]

\[ E = \text{External.} \]

Example:

At a, \( d = \frac{1}{2} \) squared into \( E = 0 \) or

\[ \frac{E}{24} = -1.5 = 0 \]

\[ (\frac{1}{2})^2 = 1 - 16 \]

\[ b - d = \frac{4}{2} = \frac{E}{24} = \frac{2}{6} = 6 = 0 \]

\[ (\frac{1}{2})^2 = 9 - 16 \]

\[ c - d = \frac{9}{2} = \frac{E}{24} = \frac{13.5}{13.5} = 0 \]

The same offset distances apply to the corresponding points on the other tangent.
In the Drafting Division are combined a number of varied activities. The major part of the work, employing a large force continuously, is naturally that of current drafting for the other divisions and branches of the District office and for the 25 Forest Supervisor's offices. Another important line of work consists of the preparation of the standard working base maps. For each Forest there are maintained maps on three scales, \( \frac{1}{16} \), \( \frac{1}{8} \) and \( \frac{1}{4} \) to the mile, respectively. The first is lithographed in one color, the second in two, while the third is printed in tri-color editions similar in appearance to the topographic quadrangle sheets of the U. S. Geological Survey. The three styles of maps are usually prepared from one compilation which is on the one inch scale. A compilation is made very accurate and complete. Co-ordinates are laid on polyconic projection and after platting all available geodetic control, the details are worked out by an assemblage and co-ordination of existing data of all kinds. This includes principally the public surveys of the General Land Office, the topographic surveys of the Geological Survey, Coast and Geodetic Survey and other Government Bureaus, Railroad, irrigation and other private surveys and finally the original data collected through the special surveys and efforts of the field force of the Forest Service itself. The published maps, through the process of expert assemblage of all data through which the compilation has
passed, presents a map more complete than any others available. Upon the accumulation of new data, corrections, additions, etc., the maps are revised and kept as nearly up to date as is possible with a rapidly developing country.

Another branch of the work of this division is the keeping of alienation or status records. To maintain authentic records which keep track of the many different changes affecting the private land claims during the progress of their passage to final patent naturally involves a considerable amount of work.

The Drafting Division, too, is charged with the responsibility of keeping statistics relating to all activities of the Service. These files, combined with the map data comprising more than 10,000 different maps, form quite a voluminous but valuable record.

The map printing work of the District is also in this division. The amount of blueprinting is considerable as is also the case with the photographic work. The equipment is modern and up to date and includes what is probably the only photostat machine so far introduced in the state. This has been in operation for over a year now and the results are such that its value and convenience to almost any engineering organization can scarcely be over-estimated.

Our own Fashion Plates
Field Uniforms designed by various Authors

by Cheatham
Road Survey Crews

by Dept. of Roads
Entry Surveyors

by Yim Jule
Reconnaissance

by Movies
Heroes

by Necessity
Stern Reality
Lautz: "How do this year's styles differ from last year's?"
Cool: "Well, this year you don't have to wait to watch them climb on a street car. Get away from that horse's head?"

First Steno—"Did you notice Jimmy Yule, that good looking fellow that sat right back of us at the Bijou?"
Second Steno—"Oh, that handsome chap with the red necktie and tan suit that wore his auburn hair pompadour? No; why?"

Said Fisher, "Now what shall I do, With this hungry reconnaissance crew, The high cost of grub Is a terrific rub, So I'll feed them on Clearwater stew."

Oh, here is our old friend R. Bee, Who said to himself, said he, "If I get to Hell I hope that the Bell Will put in a wire for me."
Grading Rules for Reconnaissance Men

A draftsman who drafted for Uncle Sam,
Once handed himself this little slam,
If I draft for my draft,
Then my craft is a graft,
Instead of a draftsman,
A graftsman I am.

Taylor: What’s 'at comptometer cost?
Calkins: 'Bout smuch as a Ford.
Taylor: How fast does it multiply?
Calkins: 'Bout 'sfast as a Ford.

AIN'T HE THE CUTE LITTLE JOKER?

Jimmie Yule: “I have sawdust under my fingernails.”
Charlie Farmer: “Have you been scratching your head?”

“This towel is disgraceful,” declared a drummer at a logging camp bunk house.
“Boss,” said the bull cook, “seventy-five men have wiped their hands on that towel this morning, and you are the first to complain.”

Mr. Urbanowicz (District Fiscal Agent) scrutinizing Swan’s expense account: “What! Two dollars for a lower to Sand Point? You only paid a dollar on your last trip.”
Swan: “I know, but you see there's been an increase in the berth rate since then.”
Hark, hark, the dogs do bark,
The Surveyor's circus is nigh.
See the men and the babies,
The nurses and ladies,
With tents, tinware, and transits piled high.

Oh, there is a doctor named Wier,
Who delights in things that are queer,
He had a close call
When a fungitic gall
Sprouted inside of his ear.

Agent: (entering Frank Bonner's office) "I've an attachment for your typewriter, sir, which I—."
Frank: "Well settle it with her. Your love affairs are no concern of mine."

A young lady, traveling in the Rocky Mountains, was recently introduced to Duff Jefferson, Ranger on the Lewis and Clarke Forest, who claims to have killed no fewer than 400 bears.
"Duff," said the introducer, "this girl wants to hear some narrer escapes you've had from bears."
Duff threw out his chest, rolled a pill and said:
"Young lady, if there's been any narrer escapes, the bears had 'em."
R. B. TELEPHONE.

The "Five Foot Shelf" is piffle and pelf,
And useless as useless can be.
It's no good alone with no "Telephone,"
A "Manual" by Adams,—R. B.
Roosevelt may pass, but Wilson's an ass,
As anyone plainly can see.
He's highly ill-bred who never has read
The "Manual" by Adams,—R. B.
How can you expect to ever connect
With the higher things that be.
If you do not take home that wonderful tome,
The "Manual" by Adams,—R. B.
The Man Who Invented Logging

It was Saturday evening and the trail crew was having a very inter­
esting meeting of the "fire-side league." The lone Forest Student
was trying to explain to the rest of the crew (mostly old lumberjacks)
the advantages of overhead skidding.

"Say, Boy, did you ever hear of the
man who invented logging?" asked
the oldtimer.

"No, I don't know as I have," an­
swered the student.

"Well, your education has been
sadly neglected," replied the
oldtimer. Let's see now, it was
when I was just a kid that I
heard of Paul Bunyon. As I re­
member it, there ain't no exact
date given for his birth, he
just grewed. I didn't get
around to work for Paul
until he was loggin' on the
Great Lakes. It was the
winter of the blue snow
and his camp was up
where the Little Gimlet
empties into the Big Auger.
We was figurin' on deekin'
our logs on Lake Superior. Paul was his own efficiency engineer. He
never figured labor costs by standin' round with a stop watch countin'
a laborer's motions and deductin' the ones used for borrowin' chews,
goin' for drinks, inquirin' the time, dodgin' the boss, lightin' pipes
and preparin' for quittin' time. Paul eliminated all the labor he could
and I remember his sayin': "What's the use of all this sawing, swamp­
ing, deekin', cutting crosshauls, grading roads, loading, hauling and
landing, when I have Babe?"

"Who is Babe?" asked the lad.

"Babe! Don't you know who Babe is?" Well, I'm surprised. Babe
was Paul's big blue ox. He was seven axe-handles between the eyes
and as strong as the breath of a tote-teamster. No lake was big enough
for a waterhole until Paul dug the basin where the Great Lakes are
now. Every time Babe was shod they had to open up another Minne­
sota iron mine. He could never be fed twice at the same camp as one
meal exhausted all the feed one outfit could tote in a year. In spite of
his overhead costs and maintenance, Babe was a very valuable piece of
equipment because of his high efficiency and low operating cost. Babe
loved a joke and would slip up behind a log drive and drink all the
water out of the river, leaving the logs high and dry. Again he would
stamp on a ridge forming a lake shore and crushing it down, let out
the water to flood some riverbed and drown out some low-water drive. He pastured all over northern Minnesota and the countless little lakes of that region are but the tracks of this mammoth bovine. But enough of Babe for a while, we were talking logging.

This is the way Paul used to do it. He simply hitched Babe to a section of land and snaked the whole 640 acres to the landing at one drag. There the trees were cut off just like shearing sheep and on the return trip the logged section was hauled back to its original place and another timber one hauled out. Six trips a day six days a week just cleaned up a township, for section 37 was never hauled back on Saturday night but left at the landing to wash away in the spring."

In the silence that followed, up spake Oscar Anderson No. 2, the veteran of many a hard logging job.

"Say, Kid, did you ever hear of Paul's dog Fido? Well, he was the bug bear (not bearer) of the green horns. Paul used to starve poor Fido all winter, then just before pay day feed him all the swampers, barn-boys and student-bulcomoks. The very marrow was frozen in their heads at the thought of being turned into dog food. Their fears were groundless, however, because Paul was too kindhearted to let his dog go hungry. Fido fed sumptuously all winter on the watch peddlers, tailor's agents and camp inspectors."

By now the rest of the crew had "come alive" and the marvelously instructive tales about this wonderful logger and his associates came thick and fast. The ignorant student pulled his ears forward and picked a green cone from his soft seat.

"Say, Ike, you remember that year when the mosquitoes were so bad up on the big Onion? They grewed 'em big there and Paul was sure up against it. The mosquitoes of these days ain't in it. Now they don't weigh more than a pound or measure more than 14 inches from tip to tip. Those oldtimers were the size of a large blue crane and they were so thick they jostled one another like a bunch of men trying to beat a lone woman to a seat in a street car. Through a gentleman's agreement, they took turns about eating, but this did not prevent quarrels and bloody duels between the big buck mosquitoes. To these fraticidal battles, Paul and his crew owe their lives.

The men were kept inside the camps with the doors and windows barricaded. Armed with axes, pike-poles, and peavies they fought off the desperate insects that tore the shakes off the roof in efforts to gain entrance.

Then Paul thought of the big bumble bees he had known as a boy, and sent sent home for several yoke of them. These he hoped would conquer and destroy the mosquitoes. Like many similar experiments, the cure was worse than the evil, for they intermarried with the mosquitoes and their offspring combined the terrors of both. They had stings fore and aft and were able to get you coming or going. In the run though, the bee blood in the hybrid insects proved their downfall. Their craving for sweets could only be satisfied by sugar and molasses in great quantities, for what is a flower's sweet to a bee with a 'ten gallon capacity.' One day the whole tribe flew out across Lake Superior to attack a fleet of ships bringing sugar to Paul's camp.
They destroyed the ships but ate so much sugar they could not fly and all were drowned."

Then up spake Bill Clute, a veteran of 70 winters.
"Speakin' of walkin', I remember how Paul used to hurry. He never used a railway for his more important trips, always preferin' to go on foot. In the winters he used to use snowshoes and could cover some ground on the webs. One morning he left Akley, Minnesota, for Westwood, California. It was in the early spring and there was still some snow the woods. So with the absence of his usual forethought, Paul strapped on his snowshoes. Before long he ran out of the snow belt but kept right on without reducing his speed. The sun poured down with increasing warmth and the dust of the desert rose in clouds around him; his mackinaws and heavy winter clothing grew heavier at every step, but none of these things feazed Paul.

"He intended to travel as the crow flies and hit Westwood exactly, but the heat played a queer prank that altered his course. The sun and the hot sand warped his left snowshoe more than his right one and at every step his left foot pulled out of line. He unconsciously traveled in a huge arc, and much to his disgust he came out at San Francisco. Thus it was necessary for him to make an extra 300 miles north. It was late that night when he arrived in Westwood and he had used up a whole day coming from Akley."

"Say, that reminds me of old Brimstone Bill," said the packer. "He was the custodian and chaperone of Babe, the big blue ox. Bill was an authority on oxen, for, as he used to say, 'I've worked 'em and fed 'em, doctored 'em and cussed 'em ever since they was invented.' Babe was quite a care for Bill but he knew his every thought. Bill once remarked, I know that pernicious old reptile same as if I'd been through him with a lantern.'
"The remarkable likeness we have of Bill shows him as he looked most of the time, pursuing Babe and mentioning the names of a lot of people and places spoken of in the Bible."

"Paul was a resourceful old cuss," drawled Slim, the cook. "Many time a man with a good keen bean on him can turn catastrophe into victory. Such a man was Paul Bunyan. The winter of the blue snow, Shot Gunderson was foreman on the Big Tadpole river. He landed all his logs in a lake and in the spring boomed them three times around the lake before he found there was no outlet to it. The lake was surrounded by high banks and the nearest drivable stream was ten miles away. Apparently the logs were a total loss. Here's where the brains come in. Paul had a cook named Sourdough Sam, who made everything but coffee out of sourdough. He had only one arm and one leg, the other members having been lost when his sourdough barrel blew up. Paul had Sam mix enough sourdough to fill the big water trough and hitched Babe to the load, hauled it over and dumped it in the lake. When the mass "riz" as Sam said, a mighty lava-like stream poured forth and carried the logs over the hill to the river.

Another time a foreman named Chris Crosshaul took a big drive of Paul's down the Mississippi to New Orleans and it was discovered when the logs were in New Orleans boom that he had driven the wrong logs. It was up to Paul to drive them back up the stream. It took Paul two days and ten pounds of P. A. to think out a solution to this problem. Finally he had it. Feeding Babe 70 barrels of salt, the thirsty beast drank the upper Mississippi dry every day and sucked the rest of the water upstream. On this swift northbound current the logs were carried back to Minnesota."

"Say, Slim, your speaking reminds me of the cook Paul had up on the Big Piney," said the little Swede. "We had the devil of a time with cooks for a while, for to cook for Paul a man had to be a kind of Col. Goethals to handle all the crews and machinery. One cook got lost between the root cellar and the flour bin and was nearly starved to death when he was found. Some men could handle the machinery all right but the trouble was they cooked just like machines, too. One would-be cook wanted to make soup out of everything. His idea of a lunch box was a jug or a string to freeze soup onto like a candle. When the big tote sled loaded with split peas went through the ice into Bull Frog Lake, this soup fiend served warmed-up lake water till Paul fired him.

"Then Paul hired Big Joe, his cousin, and Joe sure could cook. He was the first cook
to serve the crew pancakes for this was too big a job for any one else to undertake. Joe built a special stove with griddle tops so big that he had to have colored boys with hams on their feet skate around on them to keep them greased. No one but these colored brethren could stand the heat. Joe’s hardest problem was to call the men to dinner. The works were so big that Paul had three crews—one going to work, one on the job and one coming from work. So Joe had Big Ole, the blacksmith, make a dinner horn. This horn was so big that no one but Joe or Paul himself could blow it. The first time Joe blew it he blew down ten acres of pine. The next time he turned the horn up but the results were as disastrous as the first attempt, for the blast caused a violent storm and cyclone. So Paul junked the horn and shipped the iron east where it was made into a tin roof for a big Union depot.

When Joe started to cook in California there was trouble right away. The newspapers and scientific men had a lot to say about a volcanic eruption at Mt. Lassen. Mt. Lassen was where Big Joe made his bean hole and when the steam worked out of the kettle and up through the ground everybody thought the old mountain had turned volcano.

Speaking of cooks reminds the old timer of Big Ole, the blacksmith, and he wheezes thusly: “Big Ole was blacksmith at headquarters camp on the Big Onion the winter of the blue snow. Ole was the only man who ever shod Babe single handed. He once
carried two of these shoes a mile and sunk knee deep into solid rock at every step. Ole made all the cant hooks for the camp out of the scraps left from shoeing Babe. He used to punch the holes in the doughnuts for Ice but at the request of Paul he stopped because he couldn’t handle a punch large enough to make the required size hole.

The commissary clerk pulled this one: "Johnny Inkslinger, Paul’s head clerk, was a crank on economy. He made a self filling pen by running a hose from the ink barrel into his fountain pen. This saved time. One winter he left off crossing the ‘t’s’ and dotting the ‘i’s’ and saved nine barrels of ink."

Then just to prove to the Kid that Paul was a very versatile man, the boss pulled one about Paul after he quit logging and went to surveying.

"Paul Bunyan, who worked as county surveyor out in Kansas, had some reputation in his profession. The following is an account of a job he did for Silas Emery. Silas himself told the story to a party of Rock Island engineers who had taken refuge in his toolshed from one of the Sunflower State’s justly famous summer showers.

"I hired Paul," said Silas, "to run out my north line because my neighbor was aimin’ to string a fence on what I knowed was my land. They had been a stone set twenty rod northeast o’ my cow barn when the Widder Smith owned the layout, but seemed as if I couldn’t rightly locate the durn thing. But Paul, he had the government notes fer the whole county and the one west, so I knowed he could fix me up proper.

"Well, out him and his long lagged boys come one mornin’ at sun up and set out to find a monnment to
start out from, but they didn't find none till they come to the second range line east; but that there was a buffalo horn set seven inches down in gravel at the edge of a creek, as the notes called for, so Paul he felt safe to start and they lit out. They'd chain out 80 rod after the compass was set level and the proper declination set off, and then Paul would pull his instrument up and go what the boys had got to and start 'em off again. And then this-away, bein' right pert steppers, they seeyayed them seven miles in two hours, and come to were my corner was supposed to be at. I recollect Paul was lookin' mighty cocky when he come up to where the last pin was stickin' in the ground.

"'Thar she be.' he sings out, 'jest six inches underground, and if you'll shove down on that there pin you can find her yourself.' 'Well, I goes over and shoves her in clean up to the red flannel but nary stone did I tech ner feel.

"'Now Paul havin' the name he had for doing tiptop work I felt right disappointed thinkin' of him amissin' that stone, and I reckon I showed my feelin's some, too. Paul, he wasn't lookin' so cocky no more neither. Never did I see a feller more put out. He reads all his guvment notes overtime and
agin, and him and the boys they puts down a whole raft of figgers and takes turns to addin' them up.

"Then Paul gits up and takes their sightin' pole and rams her down where the pin was settin.' Full 2 foot he driv that there pole 'fore he give it up as a bad job, and set down and went to pawin' over that old yaller note book again. 'Fore he set down, though, he allowed as how he'd give up and take to ranchin.'

"Finally I heered him snickerin' and I looked over to whar he was, and thar he set grinnin' fit to kill. "Come here, Si," sez he, "and read the discrïphshun of this here monnyment." Seems he had overlooked readin' that there discrïphshun all this time cause of it bein' over on the right-hand page with figgerin' all 'round and runnin' into it. But there it set, writ plain enough for anybody once you noticed it. "For the northeast corner of section 14, havin' run out of buffalo horns, I set an old grindstone purloined from the Widder Smith's shed, six inches below the surface of the ground."

"Yep, the pole Paul had shoved down two foot was stickin' plum through that there corner."

The Kid sighed, feeling keenly his inordinate ignorance, and crawled to his bunk without a murmur.

THE DRAGON.

Sometimes the mill runs nights
And then
Is when
I like it best—
I like its thousand lights
That gleam
And beam
Upon the West;
The sun goes down, and there
Instead
A red
Glow fills the skies—
Upon the hill
The dragon mill
Looks down, and winks its eyes.

—Douglas Mallvch.

Here by the camp-fires flicker,
Deep in my blanket curled,
I long for the peace of the pine-gloom
Where the scroll of the Lord is unfurled
And the wind and wave are silent,
And world is singing to world.

—Service.
In the evening when the day’s work is over, you’ll find the fellows grouped around a blazing camp-fire. A feeling of freedom and democracy seems to hover over the group of weary workers of the Forest. The restraint and hypocrisy of civilization with the narrow confinements and petty conceptions of life, no longer holds sway over them. To each of the resting group comes a realization of the freedom and peace of the life which they lead.

As the night closes in and the dark silhouettes of the stately pines as they tower into the sky, grow dim and more vague, finally blending with the circle of blackness which surrounds the fire, more logs are piled on the glowing embers and stories of adventure, life and freedom are heard. These are stories that have made the camp-fire famous and these are the fellows, who, before the final good-night pipes are knocked out, tell many of the real stories of the wilds as they themselves have seen them.

In contrast, just take a moment to glance at the motley assortment of would-be foresters, which gather about the big stove up in “Jim’s Domain.” As we watch, the crowd grows, more coal is put on the stove and the loafing students, spring bunk like this:

K. Wolfe (to Sam Cook): “I say, Sam, what are you celebrating anyway? Where’d you grab onto that white collar?”

P. Bischoff: “Let him alone. Hasn’t he been waiting the last month for the laundry to send that collar back to him.”
SOME SPEED.

Sandy: “I sure got a good one on the Dean. He and Spaulding were arguing about the comparative merits of a Hup and a Saxon. The argument got heated and they bet a hundred on it. The bet was to be decided by the outcome of a race between the two. But at this point they met a snag because the Dean insisted on making it a 500-mile race. Tom got real peevish about it and wanted to know what the object was of making it such a long race.

“Well, says the Dean, “y-y-y-you know, Tom, that isn’t long when you consider how s-s-s-s-l-slowly I pick up speed.”

SURE, ANYTHING.

He told her the age-old story, and, torn with emotion, waited for a few short words that would decide his fate.

“Hughie,” she said, “before I give you my answer you must tell me something. Do you drink anything?”

A smile of relief lighted his handsome countenance. Was that all she wanted to know? Proudly, triumphantly, he clasped her in his arms and whispered in her shell-like ear: “Anything,” he said.

OVERHEARD AT THE FORESTER’S LUMBERJACK BALL.

Jack Layton, who doesn’t want to be a forester—“You foresters are too rough and uncouth.”

Simpkins, who doesn’t want to be a lawyer—“A lawyer is a lowbrow who induces two men to strip for a fight and then runs off with their clothes.”
The Co-Ed—"Bill, can you name over all of the girls you have been in love with?"
Bill Kane—"Sure, I know them all by heart."

Telegram from Professor Bonner in spring camp to his wife in Missoula—"Have forgotten drawing tools. Please forward by mail on next stage."
Note in reply from Mrs. Bonner—"Dear Jim. Do you want your paintbrushes or a corkscrew?"

Carney—"Do you know the soldier's name for snoring?"
Swain—"No, I do not, but I would like to learn of it."
Carney—"Sheet music."
Swain to Professor Spaulding the next morning—"By jove, Professor Spaulding, Carney taught me a good joke last night. Do you know what the American soldiers call snoring?"
Professor Spaulding—"I'll bite."
Swain—"Blanket music."

Professor Spaulding (to Bill Kane)—"If you don't stop coming late to class, I'm going to have you shot at sunrise."
Bill—"You couldn't I don't get up that early."
Puzzle Picture—Find an Australian Forester.

Hint to Puzzled Reader—Man with pipe in his mouth is Professor Bonner. Man with pipe in his hand is Editor Lansing.

Dean Skeels (to Carney in the ranger school class in log scaling, demonstrating a formula on the blackboard)—"Oh, we have neglected to square the diameter.

Carney—"Sure enough we have sir, ain’t we the couple o’ blunder-headed mutts?"

In the Office—

Dean—"Well, Jim, I’ve got s-s-s-some tobacco now."

Jim—"Whose?"

Drake—"What do you boys mean by cutting your forest management class?"

Students—"We didn’t, sir, you said you had rheumatism in your shoulder and couldn’t talk and you excused us."

"Peg," demanded Irene, "How did you get that gash on your forehead?"

Peg—"Guess I must a’ bit myself."

"Bit yourself," scornfully, "How could you bite yourself away up there?"

Peg—"Guess I must a’ stood on a chair."

Mrs. Murray—"Young man, is there any insanity in your family?"

Peg—"Why,—er—yes. I’m crazy about your daughter."
A PAGE OF CARTOONS

We all a-DORR SKEELS

PROF. D. MO

Prof. Drake

in action

HASCH

Prof. Farmer

HESON

Sup' Koch

Sporography

PROF. DEEY

PROFESSOR JIM

ALBERTA

(Australian)

ACOLOADOR FRIEND

"JEFF"

WHAT PRYSE?

"SHORTY"

ZEIGER

SILVER! WHITE

by E.T. Drury

CHANCE SKETCHES AT THE FOREST SCHOOL.
A FEW THINGS THAT ARE ALWAYS LOST.

Weyer's suitcase.
Bill Kane's notebook.
Bishoff's plug of tobacco.
Skeel's P. A.
Spaulding's "line of collimation."

Prof. Rowe—"McQuarrie, what are the two main parts of the earth?"
Mac—"Land and water."
Rowe—"What does the land and water make?"
Mac—"Mud."

The Dean's Young Hopeful—"Professor Tom, how did you get those red marks on your nose?"
Professor Spaulding—"Glasses."
Young Hopeful—"Glasses of what?"

100 PER CENT.
"How's everything at the Theta House?" asked Simpkins.
"Oh," replied Wolfe, "She's allright."

Wingett (collecting Kaimin notes)—"Look here, Dutch, you've put it off long enough. I shall expect you to pay that $1.50 Monday."
Dutch—"Atapep, old man, I wish I had your optimism."

"S-s-s-say, Drake," asked Skeels, how'd yeh get that s-s-stitch in your side?"
Drake—"Well, one day, when I was to the city, I got hemmed in a crowd."

"A forester should stand the life in the woods like a tree; and should stand the knocks in the mill like a log; lest he go to waste with the culls."—Schench.

Lights of the city, ye may not hold me,
Hearing the call of the star I go,
Dark though the trail and pack so heavy,
Guiding my feet in the paths I know.
—"Outing."

THE PATH.

There is no path that seems the same
To ev'ry wanderer who passes:
For one the maples are aflame;
Another sees the dying grasses.
—Douglas Malloch.
The Ranger sat on the mountain trail,
There was blood on his nose and woe in his wail,
And he gazed at his fleeting cayuse's tail
And swore a blue streak, by Judas.

"The son-of-a-gun is a pie-faced fraud,
She piled me quick and she piled me hard,
She got me when I was off my guard,
She ain't worth a damn, by Judas."

"She was sired by a mule in the days gone by,
Damned by a mare with a big glass eye,
And everyone else from Cheyenne to Nye,
The son-of-a-gun, by Judas."

Then the Ranger arose with a weary air,
And followed the fleeing cayuse mare,
And all one could hear was the following "prayer."
"The son-of-a-gun, by Judas."
I saw her first at the Kappa house,
    I looked. I was amazed,
For on a lass so wondrous sweet
    I ne'er before had gazed.
No Venus dreamed in ancient art,
    No fabled Lorellei
Could e'er have thrilled me to the heart
As this fair girl. And I
Admiringly, bewitched, surveyed
    Her, looked her up and down
From dainty shoes to chestnut hair
    That coiled upon her crown.
Her baby-staring eyes of blue,
    And Oh! her cheeks of pink
But as I looked, Alas, I knew
    She was so far above me.
She a co-ed, proud and fair,
    Pray what chance had I?
A Ranger poor, a mountain boy;
    I felt that I could cry.
But look! she smiles, she speaks to me,
    I shyly tipped my hat
What could I do but answer back
    And start a little chat?
The Angel spoke. Oh heaven help
    Me for this rude intrusion
No sweet and dainty chick was she
    For then came disillusion:

"Hully gee, kid! I lamed you coming down the street, and I ax tu the
Janes in the house, "Hands off, he's mine; I saw him first. He ain't none
of them street corner mashers, hes one of them Shorthorns; I guess I know a
regular guy when I slant him! I knowed you'd try to make me and while I'm
a puffeck lady and don't flirt with none of them bums that hang around
Kelly's or socate with law studeys, I don't objeck to meetin' a nice guy like
you. I knowed when I saw you comin' you was just the gink to take me
down to the Coffee Parlor and steer me up against a great big porterhouse
wish mushrooms, and after we fall for the Bijou, we can———"
"GOOD NIGHT."
SPRING
Day Dreams of an Upper Classman.

I says to the Dean the other day, I says friendly like as I borrowed a Fatima from his desk.

"Dean," says I, "the spring has came."

The Dean's language is fierce when he gets peeved and I guess he got mad all right—all right because he says to me, says he, "Spring or no spring, you spring into the Spring of Knowledge and spring a little data into that empty notebook of yours, or you'll get sprung outa this office dampwrick," he says.

Now the Dean was unfair, not to say unjust, both to me and the poetic season of the year. He doesn't realize, I guess, how much the varied beauties of the wonderful spring fall onto the neck of a budding young forester like me, and sob sweetly in his ear about the Flowers, the Forest Primeval, and Love, and Isabel, the things that really count in this elusive something called Life.

And then I met Jerry Nisson. I knew he would understand and I says to him, says I, "Ah, Jerry, 'tis springtime, the season when a young man's fancy lightly turns to thoughts of the Thetas."

Did you ever see Jerry's eyes snap when he gets real mad? "Spring, is it?" says he, real unkindlike, "Spring is it!" Then—"It's about time you were springing something. You run right into the gym and spring into that moth-eaten track suit and see if you can't get a little spring into that off-limb of yours. Huh! Last year even Bill Long tied you in the high jump in that meet with Idaho," he says.

I'm not in favor of pulling stuff that some Forest Service guy has pulled first, but as Fay Clark said when he lectured with those colored slides: "If you will but follow me for a moment I will guide you into the vast and distant future . . . ."

To-wit: We have with us Spring. Spring! (One more jump and we make it). Spring—with all its golden dreamy days. Think of the days that are here with the little blades of grass peeping forth from their winter B. V. D's growing plentiful enough that Daddy Aber is chasing the frost off of them. Think of the spring chickens that are ambling around in their new costumes through our range of vision (if we have any luck a'tall). The sun in shining, the chicks are again wearing their "guess again" plumage—Ah-h-h-h-h Boy.

The Dean, he doesn't see these things in the same light I do. All he thinks of is how to make up volume tables, the cost of logging, and skidding factors. Don't it getcha how these highbrows will work when they ought to be laying out some place on the grass absorbing the atmosphere and ants? Me—I like the open air—like a job on a lookout point, or soil classification work in the valleys—you know, out where they do things in a big way, with an expense account, not an offens job.

Ah! The Spring! Dandelions! Daydreams! All the essence of the poetic arises in my soul and declaims that the Spring is with us once again—t'ell with studies.

*Tain't so—I never said it.—THE DEAN.
Oshkosh, Wiskonsen.

Hello Hagen:

De vas a long time now ven i herd from yu. Ant yu going to rite no more? Aym working op har by Sven Akerson Camp numer 4 and Ay don’t got time to rite now. How is everyteng out dar in Fargo? Ay bat yu de ant lak de ust tu be ven yu and I varmed de chaars in Ole’s buffet. Dem var gude times. Yu ever here from Ole? Val Ay yust got von letter which Ay hear Ole is doing time. Fonny ant it. Ole vas de most onest man vot ever Ay kno. He give de digest glas beer in Manasota and den dey put him in de jug. It ant rite Ay tal yu. Ven ve swede fallers run de countri vi vil put a stop to dat stuf.

Val how is Tillie? She lak yu hol lots yit Ay tal yu dat is von fin gurl. She yust come over from de ol countri and tol me al abot it. She say de gurls al esk for yu. Yu was a grat fellar vid de women. Val ven yu kom down har look me op. Vi ar yust femten mil nort vest from Oskosh. Aym vul kok har fin yob tu. Aym going to give des letter to Lars Hegland tu give tu yu. Hes going to Fargo. Ven he komms esk him for dis letter. Let me hear from yu rite away.

Yures in snuss

COPEN.

Bruce Metlen sat at his desk at the Sigma Nu house gazing listlessly through the morning’s mail. Bruce was one of the hardest working men in school, carrying two hours in journalism, three in law, four in commerce and accounting and two hours more in some cinch course, under Phillips, I think, a total of eleven. Suddenly he looked at one of the letters with a new interest. He extracted it from the envelope and opened it. It was from the registrar. It said:

—and as you are passing in but two hours, I regret to inform you that you are dropped. You are required to leave the university at once. Kindly take your Ford with you.”

Bruce lit another cigarette. “What a difference a few hours make,” he mused.

Ranger Parks, crossing the street towards the M. M. Co., and noticing a sign, “CAST IRON SINKS” — “Huh, any fool knows that.”

Mrs. Lennes—“I need a new hat, dear.”
Dr. Lennes—“All right, I’ll have the students buy some of my new textbooks on Math.”

Prof. Rowe (Finishing a lecture on volcanoes)—“But no one has ever been down to see what lava really is made of, or how it is made. for it is too hot down there. But we may get there yet, some of us.”
CARLSON'S LETTER.

Fargo
Den 2 to 2 March

Dere Copen:

I vas so glad sum ay kudbe tu here from yu. Des is a heluva place to live an york. Yu know how I lak to chew snuss yust some Tillie lak to eat lute fisk. Ay ant ban abel to buy a smell of it har.

Say Copen! does big beers th at Ole used to slide out on the mohogani vood mak hair grow on a man's chest. Nort Dakota may be alrite but give tu me good ol Manasota ven it comes to W-B an the Milvake amber fluid.

Ay had a nice letter from Christina last veek, by golly ay tal yu sum day me an lil' Christina ban going val yu know. Yust so sune sum ay can get $1 to pay down on the furniture an the rest vont be so bad at $1 per veek.

Lars he opened the letter becau he vas expect­ing that $5 yu own him fer drenks.

Gud by for so long
HAGEN

S. P. Rite sum and send P. D. Q. a pakage of W-B.

LEAVES FROM A RANGER'S NOTEBOOK.

Fountin pens are so named because they squirt all over the expense account.

I wouldn't marry a blonde because marriage is not a subject to be taken lightly.

I read that since the Forest Service has been invented, the sale of Durham has increased three thousand per cent. Some bull.

The three dryest places in the world are the Sahara Desert, Death Valley and Missoula after midnight.

"Yes," said the old Ranger, "I guess the thing that surprises these college graduates the most when they get out in the world is to find out how much uneducated people know."

The apparel oft proclaims the man, but the present styles show up the women, says a Ranger after spending 14 weeks at U. of M. Ranger School.

"The bustle looms large on fashion's horizon," declares a lady magazine writer. "Yep, and that ain't the only place."
THE SKUNK.

As Sung, Recited and Played on the Piano by the Carlson Twins.

Vonce upon a Torsday night, ven of Tillie ay vas tenking, Of de times so gude ve spent together galore,— While ay nodded nearly napping, right away der came a scratching, Yust lak some von yentlv scratching,—scratching at my bunkhouse door. "Tis some visitor," ay sputtered, "Scratching at my bunkhouse door,— Yust dis, and nothing more."" Yah, distinctly ay remember it vas in de fine September, And each separate bite of bed bug made shivers down my core. So right away my heart start beating, ay stood repeating "Tis some visitor entreatin' entrance at my bunkhouse door,— Some visitor skol entreatin' entrance at my bunkhouse door. Dis it is, and nothing more." So sune some my wind grew stronger: hesitating den no longer. "Come in," says ay, "yures truly forgiveness ay implore: Yu see ay vas napping, and so yentlv yu came scratching, And so nicely yu came scratching, scratching at my bunkhouse door, Dat ay vas not sure ay heard yu." Har ay opened wide de door. Darkness dar, and nothing more. Deep into dat darkness peering, long ay stood von'd'ring, shivering, Sune again ay hurd a scratching, dis time under my bunk. But de atmosphere vas now broken, and de stillness gave no token, And de only words der spoken vas de silent words, "Olaf yump"! Dese ay whispered and turned around to lux square at maester Skunk! Vat in hal, yu runt.

With apologies to E. A. Poe.

MARTIN CARLSON.

THE CAMPUS—An oval bounded by Dorm girls on one side and shysters on the other. It is composed of 99 per cent paths, the rest being grass for the freshmen to walk on to save them from getting concussion of the brain.
Some Problems of the Forester

By F. A. Silcox

District Forester, Forest Service, U. S. Department of Agriculture, Missoula, Mont.

Broadly speaking, the practice of forestry may be logically classified under three headings, in the following sequence: (1) silviculture, or the growing and care of the forest crop, (2) lumbering, or the cutting and removal of the crop for use, and (3) utilization, or the creation out of the crop those products which are of service to man in his varied and multitudinous activities.

In the virgin timber regions of the United States, of which the Northwest is the largest, the most immediate problem of forestry is the cutting and removal of the mature crop in the most economical way, and to convert that crop into products to serve the use for which they are best suited.

The handling of this problem in an efficient way requires the highest degree of resourcefulness and practical engineering skill. No longer is the progressive, efficient lumberman satisfied with going in to a stand of timber to start operations involving expenditures running into the hundreds of thousands of even millions of dollars without the same kind of a high-grade technical analysis of the factors involved as is demanded by a water-power company before it builds its dams for hydro-electric development.

Steam and electricity have entered the woods and the removal of a forest crop today is different from what it was when all depended on the two-horse team and man. Every part of the work calls for some engineering skill, from the making of the detailed topographic map upon which the estimates of timber are platted and the lay-out of the logging plan, giving the location of camps, chutes, landings, railroads, and the like, are graphically shown, on through the saw-mills to the chemical laboratories in which the wood is turned into paper, silk, imitation cotton, alcohol or similar products.

The mapping of large areas upon which the timber occurs must be done accurately, if the maps are to be of the greatest practical use. Upon their accuracy depends the integrity of the estimate, the determination of the distances the logs must be removed by the various methods of transportation, the division of the area into natural logging units, the location of the camps, and in fact all of the data upon which modern forest valuation must depend to arrive at a scientific appraisal of the standing timber and the cost of removing it.

Special engineering training of the highest order is needed to redeem the responsibility for the management and utilization of this primal resource. Lumbering represents one of the largest industries, if not the present largest, in the Northwest. The future holds the possibilities for the trained forest engineer to render the same kind of valuable service to the wood-using industries of the virgin-timbered region as the scientific farmer has already rendered to the farming industry of the whole country. This is an age of research and applied science. The industry or institution which fails to recognize this fact is doomed to lag in the race for achievement.
The forester is not only concerned, however, with the cutting, removal and utilization of the virgin crop. Such a condition is temporary in the life of a nation. It is the duty of the forester to see that the cutting and removal of the crop is done in such a way as to insure a new crop of the maximum yield per acre of merchantable timber product in the shortest possible time. He must practice silviculture and grow crops. To do this he must know how to collect seed and to raise young trees in the nurseries for field planting; how to protect the growing stands from the ravages of fire, fungi and insects; how to build trails and telephone lines to make the forest accessible; how to thin out the forest crop to let in just the right amount of light to promote the most rapid growth, yet at the same time not let in so much that the timber will be limby and poor for lumber; how to get the best combinations of species to produce the maximum yield and meet the highest use, and the like.

In the practice of forestry, the forester will be called upon to meet all of the above-mentioned demands. The opportunities in the virgin-timber regions for the practice of silvi-
culture will come through his ability to meet the practical needs of the present pioneering conditions of the industry. He must devise better and cheaper methods of logging, secure closer utilization and less waste; he must accomplish all of this so that it returns a profit to the operator.

Although under present economic conditions there are not many private owners who can afford to practice silviculture, it is practically certain that in the future a plan will be worked out whereby private owners will practice silviculture in the handling of their non-agricultural timber lands and that such lands will be left in such a way that they will be a source of future revenue to the owners and the communities rather than a waste. The big problem under such conditions is to practice silviculture and at the same time not impose an economic burden on the operator greater than what he would have to assume if he logged under methods which gave no thought to a future crop. Cutting the cost of logging by more scientific engineering methods, the securing of a closer economic utilization of the product, and the working out of the big land-management problems of public versus private ownership, taxation, fire-protection, and the like, offer a big field to the man properly trained for this work.

CASEY JONES, THE LOGGER.

(Author Unknown)

Come all you woodsmen if you want to hear
About a B. C. Logger who had no fear;
He knew his duties, but made one mistake—
He chopped down trees, and shoved 'em in the lake.
He was a modest Logger, all unknown to fame;
The price he got for logs was a downright shame;
But if heroes are rewarded as their deeds command,
He is logging off timber in the Promised Land.

When the whistle blew each morning at half-past four
Casey left his wife at the cook-house door,
Picked up his peavey, started down the track;
Never had a notion that he wouldn't come back.
The skidroads one day got greasy—cable wouldn't work;
The engineer knew by the whistle's moans
That the man on the wire was Casey Jones.
The logs came 'round the first turn of the road—
And, coming down hill, made a mighty heavy load.
The haul-back broke with a whirr and a hum—
And Casey Jones departed for the Kingdom Come.

"I'm sorry," said Casey, just before he died,
"There's a few logging camps that I haven't tried."
The hook-tender said: "Casey, what haven't you seen?"
"Sure I never worked at Bellingham, nor down at Aberdeen."
Mrs. Casey, in the bunk-house, spoke with much regret
Of the troubles she had had since she and Casey met.
"Go to bed now, children, he was one ray deceiver,
The next dad you get's goin' to be a shingle weaver."
OH, GIRLS, did you
KNOW THAT Jenkins'
COAL BILL was
THIRTY-EIGHT DOLLARS at the
THETA HOUSE last month and now that
HE BOARDS with the
KAPPAS WHERE they have a
BETTER FURNACE and
BETTER GRUB (Oh, Skinnay—)
THEN they have
GETZ TO feed too, but that’s
EASY SINCE Mary Brown—
LEFT SCHOOL and
DICK HOWELL moved back in on the
SIGMA NUS.
SPEAKING OF Sigma Nus—
WHAT DO YOU KNOW about their new
PLEDGE? Every other word in the KAIMIN
FOR THE last month has been
ARTHUR J. BUTZERIN. And the
FUNNY PART of it is he
GETS BY with it, and
MONDAY MORNING Sandy said he had a
SORE ARM from throwing a
JAVELIN, but he went up
SPRING GULCH instead and anyhow
SANDY NEVER was any good
AT ALIBIS because we lost the
PULLMAN MEET, so this is all,
GOOD NIGHT.
Complete Camp Outfits

Tents—Blankets—Sleeping Bags—Medicine Kits—
Camp Furniture—Cooking Outfits—Fire Arms—
Fishing Tackle—Clothing—Footwear—Snow Shoes—
Packs—Duffle Bags—Pack Cloths—Evaporated
Foods—Animal Traps—Camping Sundries of All
Kinds.

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our catalogue "C" free on request.

David T. Abercrombie Company

311 Broadway
New York City

Editor's Note—We are particularly able to recom-
mand the Abercrombie line of field equipment to
Foresters.

To secure their catalogue means an interesting even-
ing's reading.

There is equipment needed for your work that you
have perhaps never even heard of.
A Pilgrim in the Hills
(By Dorr Skeels)

Only the tenderfoot seeks to rough it. The experienced woodsman lives with as much comfort as possible in the woods. A good bed; wholesome, plentiful, well prepared food; proper comfortable clothing; and toilet equipment necessary for cleanliness and neat appearance are first requisites in the camp of the old head in the woods.

The first essential of a good bed is a waterproof covering to keep it dry in transit and to keep out dampness when in use. Pneumatic beds usually made in some form or modification of the sleeping bag are good for one-man beds. Select one the cover of which opens the full length of one side, so that ordinary good blankets may be folded into it in making up, or easily laid out for airing. Where a pneumatic bed is not available, or is not desired, and particularly where two men pack parts of a double bed, nothing better is to be had south of the arctic regions than a good heavy tarp of 10 or 12 oz. or heavier canvas of liberal dimensions, usually 7 feet by 14 feet and enough good double woolen blankets. Some woodsmen prefer to replace one pair of blankets with a comforter, quilt or "sugan" which is warmer for its weight than woolen blankets but difficult to keep clean and dry.

When necessary to travel with little weight a good warm bed for two men may be had even in cold weather with a light tarp and one pair of light blankets. The tarp should be pitched as a rather steep lean-to with one-half the tarp folded under to form a floor and to keep out damp. In front of this lean-to, at a proper distance should be built a fire of rather large chunks or small logs. This fire should be backed by a large log, a tier of small logs covered with dirt to keep them from burning out, or a large rock or wall or arch of smaller stones. For the fire avoid logs such as spruce and balsam which snap and throw sparks. Even in the coniferous forests of the Rocky Mountains it is often possible to get "hardwood" logs of cottonwood, alder, or aspen which when placed on the fire before "turning in" will smolder and coal and hold fire all night.

Tamarack or larch, red or Douglas fir, lodgepole pine, yellow pine and white pine are the best fuels in the order named. Mountain hemlock holds fire well but snaps and throws sparks. Dry cedar makes the most brilliant light.

Don't be in the woods without a good axe; it weighs less than a blanket and can provide shelter and warmth for a whole company of men. When cutting your firewood select standing dead trees, preferably pine if you want a quick fire. Don't try to use dead wood which lies on the ground, it will be damp and soggy, even green wood is preferable. If you are so unfortunate as to lack an axe, pull down and break off the lower dead limbs of fairly large trees, or the dead dry limbs that project upward, bare of bark, from old fallen trees.

The small, fine, dead branches or twigs, that persist to the trunk or to the lower limbs of trees near the main stem, are the driest fuel in the woods with which to start a fire. Roll a small handful of these between the hands until the fibres are broken and twisted and they will light easily from the first match. The long-fibred bark stripped from the dry side of trees or logs of the giant red cedar of the west and broken and twisted into a fibrous mass makes a splendid kindling; so does a handful of birch bark, but you will not find much of it in the west except near the coast.

Don't make your fire of a jumbled criss-cross tangled pile of wood. You want a camp-fire, not a bon-fire, to waste your fuel. Lay your sticks parallel in orderly fashion as you would place them in a stove or fireplace. Don't build a big fire unless necessary to reflect heat into a large tent or lean-to. Build such a fire as the company can sit near and enjoy in comfort.

You want a small fire for small cooking or a longer narrow fire to cook for a company. Usually pot hangers and a pole rigged over the fire for their suspension are a nuisance where you can get good fuel to properly build your fire. To cook for a number of men cut two small logs of six to ten inches in
For the Forest Service

.250-3000 Savage

Don’t you need RESULTS from your rifle, as well as noise?
Will anyone believe you if you “blame it on the gun”?

Which would you rather do, explain why a miss was the fault of the gun, or let a fair hit and a clean kill speak for the gun and for you, too?
You know you need the greatest possible accuracy, the highest possible velocity, the least possible recoil that any one rifle can give.

The .250-3000 Savage Is That One Rifle

Its sensational accuracy puts your bullets right where you hold—4½ inch groups at 200 yards.

Its extreme velocity (3000 feet per second) flattens the trajectory curve (mid-range height for 300 yards less than 6 inches) so as to prevent over or under shooting of you guess the range wrong, and gives the paralyzing, explosive, knock-out punch that puts big game down to stay.

And the recoil? As a distinguished authority put it, “the kick is nix!”

The .250-3000 Savage is the Forest Service solution of the predatory animal problem. It has shape, balance and grip as well adapted for snap-shooting as for deliberate long range work. Its lightness makes it easy to carry, and its clean, symmetrical outlines fit it especially for saddle use.

In details and finish the .250-3000 Savage is fully equal to the expensive European rifles which it totally outclasses in accuracy, convenience and efficiency. It has the original Savage solid breech hammerless six-shot repeating action, the only American action strong enough and safe enough for cartridges of the highest concentration.

Takedown pattern, 22 inch tapered round hi-pressure steel barrel with integral front sight base, checked extra full pistol-grip stock and forearm, checked trigger and corrugated steel butt-plate; weight 7 lbs.; price $33.00. Cartridges with soft nose or full metal cased bullets, $4.20 per hundred.

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Mention The Kalmia to Advertisers.
diameter and long enough to range all of your cooking utensils and an extra dish or two upon in a row. Lay the two sticks parallel and close enough to each other at one end so your smallest pot will set across the two legs without spilling. Spread apart at the other end only so far that your largest pan will set across both logs. Place a smaller stick as a cross piece under each end of the two parallel fire-logs to raise them a little from the ground. Kindle your cooking fire under and between the fire-logs. Preferably use split wood just as you would in a stove. The insides of the logs will cool and help hold heat. Don't try to cook with too much fire. Use your fire-logs as you would use a stove. After a few meals when your fire-logs begin to burn out, put them in the camp fire and replace with new ones.

To cook for only one or two men, follow the same plan but use smaller pieces. These will burn out after nearly every meal, but are easily replaced from the wood pile. Always keep a supply of wood on hand in camp. When you pack, if you have camped at a crossing; water hole or other common camping ground, lean a few sticks of dry wood up against a tree, rock or log and leave for the next fellow. Clean up around your camp and if you are in a timbered country be sure to put out your fire.

Take time to make a good bed. To lay down on hard, rough, or damp ground for the night is an indication of foolishness and inexperience. A good woodsman guards his health and strength and does not seek to demonstrate hardness by wasteful disregard of bodily welfare.

A good bed under you, properly built of coniferous boughs, or one of dry leaves, weeds, grass, willow shoots or long pine needles wrapped into an old blanket or piece of canvas means more rest, more recuperation of physical vigor. A soft bed is warmer than a hard one if you lack covering. Even if you are tired and sleepy and the hour is late, don't turn in with cold or damp feet. Warm and rub your feet into a warm glow; it only takes a moment and you will go to sleep the quicker and sleep the sounder for it. When sleeping with insufficient bedding, stones heated in the fire and laid at the foot or along the side of the bed will help to keep you warm.

Even if you make camp for only a day or two rig up a toilet, if only a crossed log in some sanitary place. Dig out at least a shallow hole and have a little loose dirt to keep covered from the flies that would otherwise live out there except when called to your table at meal times. If a number of men use the same camp several days, this is particularly necessary. Even a hog reserves one corner of his pen for such purposes and keeps clean if he has a chance.

Be even more careful of your diet than you would be at home. Stick to simple, wholesome food. Don't go in for a lot of knicknacks unless you have facility for packing them after providing for all necessities. On the other hand, with the mistaken theory of saving weight, don't expect to live on a flour-bacon ration or to confine yourself to only two or three articles of food. You will only have to eat the more weight of them and overwork your digestive apparatus in the effort of your body to secure all the food elements to which your varied diet of the city has accustomed you. A given weight of a properly selected varied diet will build up more animal tissue and better satisfy physical requirements than the same weight of a two-or-three-food ration list.

If you are accustomed to good living in town don't plan to change too abruptly to a coarse diet of limited variety, particularly not to one of few vegetables and with a preponderance of starches and fats. Even a horse will be put off his feed by an abrupt change of rations.

Bacon provides more food value for its weight than any other meat except dry salt pork. Salt pork is deficient in protein, while bacon is an ideal combination of protein and fat. Broil your bacon crisp, or what is simpler, fry by dropping into very hot grease deep enough to cover it.

You will favor your health if you take some yeast and make your hot cakes from raised batter or sour dough and make sour dough bread at times as a change from baking-powder biscuits or dough gods.

Potatoes and a few root vegetables are almost a necessity for a several days' trip unless you have some other source of green or fresh vegetable food.****
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STLYE B—2 inch case, four point needle, luminous letter and line.

STLYE D—1¼ inch case, four point needle, luminous letter and line.

We refer you to the report of a test made by one of the best known practical men in the U. S., Edward C. Crossman, in a letter to us after making a very rigid test. A copy of his letter below.

Edward C. Crossman, 3416 Glen Albyn Drive, Los Angeles, Cal.

The Luminous Compass Co.,
Cedarburg, Wis.

Gentlemen:—

I have looked into the pair of Night Hawk compasses you send for inspection, and find that they, like some people, are better looking on a pitch dark night than they are in daytime. There are oodles of good compasses during the day, but mighty few that give you any comfort without some sort of artificial illumination at night.

This pair of night birds seem to have the fool-proof feature of plainly marking directions and the durability of the old style compass you made, with the added and very great advantage that, in pitch dark, without previous exposure to daylight, the letters on the needle or on the floating disc dial gleam plainly through the glass. The blacker the night, the clearer the letters show.

I carried one of the old style KRAEMER PATHFINDER compasses on three big game trips and dropped it a couple of times for good measure, but I shall have to transfer my allegiances to the new bird, despite the durability of the old style.

Traveling at night is not a popular sport in western mountains, but I can imagine little scenes of the sort when a self-lighted compass would be considered bliss. Thanking you for the chance to examine and test out your new instrument, I am,

Yours very truly,
EDWARD C. CROSSMAN.

Any of the four styles mailed prepaid to any address on receipt of Express or P. O. Money Order, for $2.75.

Address:

THE LUMINOUS COMPASS

Ye who know the Lone Trail fain would follow it,
Though it lead to glory or the darkness of the pit.

Ye who take the Lone Trail, bid your love good-by;
The Lone Trail, the Lone Trail follow till you die."
supply. Their weight is mostly of water and if you must travel very light take along instead the dried or dehydrated vegetables sold by sporting outfitters. They are a little expensive, but a considerable variety of them makes possible a menu of soups, mulligans and game-stews never dreamed of by the oldtimer.

If you are used to a town diet you will crave sugar in the woods to replace richer foods of the city. Estimate the reasonable amount you will require and nearly double this for the amount you will take. At first in the woods you will long for acids and fruit juices. Of not much food value, they, nevertheless, “tickles the palate” and stimulate digestion. You need not pack canned fruits but, of dried fruits, if only for economy’s sake, select the choicest brands. Wash any of these thoroughly and soak overnight, before the slow simmering that cooks them best.

Chocolate, dried eggs and dried milk, used to be almost unknown in the woods. For their weight they rank higher in food value than almost any other food and are easily prepared and easily digestible. Egg and milk powders may be purchased at remarkably moderate prices from sporting goods dealers and all western outfitters. In western households remote from farming regions they are staple articles of domestic economy.

Rolled oats have more food value weight for weight than any other cereal; they contain more fat and contain necessary food elements in almost ideal proportions. Beans, macaroni, cheese, cornmeal, dried peas, rice, raisins, and condensed milk, are sensible, wholesome camp foods of little weight in proportion to their food value. A can of condensed milk, can and all, does not weigh any more in proportion to its food value than fresh eggs which are often offered as an example of condensed food value, and not nearly so much as fresh vegetables, fruits and the like.

Food values are most conveniently measured in calories, which represent their value as body fuels. A calorie is the amount of heat required to raise the temperature of one pound of water, four degrees F. A woodman requires from 2,500 to 5,000 calories per day depending upon living conditions, work done and the individual. Under good living conditions where the individual does not work to exhaustion from 3,000 to 3,500 calorie portions of food is sufficient. The following table shows the weight in ounces of common camp foods per 100 calorie portions.

<table>
<thead>
<tr>
<th>Food</th>
<th>Approximate Calorie Portion Weight (Ounces)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Butter</td>
<td>0.4</td>
</tr>
<tr>
<td>Chocolate</td>
<td>0.5</td>
</tr>
<tr>
<td>Dried eggs</td>
<td>0.5</td>
</tr>
<tr>
<td>Dried milk</td>
<td>0.6</td>
</tr>
<tr>
<td>Dried corn</td>
<td>0.8</td>
</tr>
<tr>
<td>Crackers</td>
<td>0.8</td>
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<tr>
<td>Rolled oats</td>
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<tr>
<td>Cheese</td>
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<tr>
<td>Sugar</td>
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<tr>
<td>Cornmeal</td>
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<tr>
<td>Flour</td>
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<tr>
<td>Dried peas</td>
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<tr>
<td>Macaroni</td>
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<tr>
<td>Bacon</td>
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<td>Rice</td>
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<tr>
<td>Raisins</td>
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<tr>
<td>Navy beans</td>
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<tr>
<td>Dried fruits</td>
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<tr>
<td>Molasses</td>
<td>1.2</td>
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<td>Bread</td>
<td>1.3</td>
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<td>Cream</td>
<td>1.7</td>
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<tr>
<td>Dried beef</td>
<td>1.9</td>
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</tbody>
</table>

It may be seen from the above table that while butter is the lightest food in weight for its food value a properly balanced ration is not reached, of fats, carbohydrates and proteins, until foods are included that weigh nearly twice as much. The woodman who wishes to travel light, however, may combine a variety of some 20 foods which weigh no more than flour and bacon or which will average more than 100 calorie portions per ounce or less than 30 ounces per day’s ration of 3,000 to 3,500 calories.

The woodman’s food will go farther if he lives right and clean with proper regard both to health and comfort. It pays to be comfortable in camp and to fix up to live like a white man. A table and seats are easily built. It takes but a few minutes to make a good bed. A clean shave every morning is refreshing, restful and soothing to mind and body. A nervous worrying horse does not get fat. It takes less food to feed a contented restful man than one who is dirty, worried and uncomfortable.
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CRUISING

A SIMPLE AND PRACTICAL RULE FOR ESTIMATING TIMBER.

By James W. Girard, Expert Lumberman, U. S. Forest Service.


The diameter breast high, or at a point about 4½ feet from the ground, plus 6 inches, divided by two, equals the average log. The scale of the average log multiplied by the number of logs in the tree equals the total gross volume of the tree.

Diameters should be taken in all cases with a diameter tape. Trees 16 inches and under will not quite hold out, but trees 24 inches or more in diameter, with 9 or 10 logs, will overrun a little.

If a large number of trees of all diameters and heights are estimated, this rule—assuming that heights and diameters are accurately taken—will check within 1 to 3% of the actual scale. The above is based on cutting white pine and spruce to a 6-inch top and larch to an 8-inch top.


The same rule as for white pine applies to these species, except that 4 inches is added to the D. B. H. in Douglas fir and 5 inches in lodgepole.

Fir cut to an eight-inch top and lodgepole cut a six-inch top.

3. Yellow Pine.

The same rule as for other species, except that 8 inches is added to the D. B. H. for trees 20 to 26 inches in diameter, but for trees more than 26 inches in diameter add 10 inches, trees under 20 inches add 6 inches. Using 8 inches for all sized trees of this species is close enough for all practical purposes.

Note—The above rules do not make any allowance for breakage or defects. If 4 inches are added to the D. B. H. of the larch instead of 6 inches, no deductions need be made for breakage or long butts.

USEFUL HINTS.

Mildewed Tents.

Mildew. Whitewash the tent with a weak solution of chloride of lime. Add salt to make it stick. A strong solution will rot the canvas. Two pounds of slacked lime to a barrel of soft water is the right proportion.

Waterproofing Tents.

Dissolve one-half pound each of sugar of lead and powdered alum in a bucket of rain water, and pour the solution in a large tub. Soak your tent for 24 hours and then hang it up to dry instead of wringing it dry. This treatment will make the canvas waterproof and will also prevent mildew.

To Waterproof Your Boots.

Melt together one pound of tallow, one-half ounce of neatsfoot oil, one ounce of resin, one-half ounce of lamp black and one tablespoon of linseed oil.
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Area in square feet multiplied by .00003 gives area in acres.

Topographic surveys throughout District One in 1915 covered 110,000 acres.

To typewrite on tracing linen for blueprinting, reverse carbon paper on back side.

Road location surveys in 1915 cost on the average $71.00 per mile.

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During 1915, final proof or "Entry" surveys were made of 188 homesteads at an average cost of $70.00 per survey, or $22.50 per mile.

In hydroelectric power sites, the horse power is roughly, one-tenth of the head multiplied by the flow, in second feet.

The average cost of all grading work on national forest road construction in 1915 was 31.9 cents per cubic yard.

In the construction camps under the direction of the office in 1915, 46,606 meals were served at an average cost of 25.8 cents per meal.
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Mr. James H. Bonner,
Professor of Forest Engineering,
University of Montana,
Missoula, Montana.

Dear Mr. Bonner:

Sometime ago when I visited the forest school I suggested to you that forest students be taught the method of obtaining solar declinations for use with the solar attachment by means of graphic methods. I enclose an article which I have written upon this subject which I think will be perfectly clear when taken in connection with the drawing. The only possible objection that can be raised to this method is where the men have to report their work to the General Land Office as in homestead entry surveys. In such cases they are required to give the declinations computed down to the last second. But even under these circumstances, on account of the ease of computing in this way and the freedom from accidental errors many of the men prefer to do their field work by means of the curve and afterwards, when writing up the notes, make the exact computations needed.

Very sincerely yours,

(Signed) ROBERT R. REYNOLDS,
Forest Examiner.

**Rules for Drafting Solar Declination Curve**


Use any notebook having pages ruled into small squares or rectangles, and a sharp, hard pencil.

1. At the left of the page write a vertical column of hours (apparent time) from 4 A. M. to 6 P. M., placing one hour upon each consecutive horizontal line.

2. Change the longitude of the station from Greenwich into hours and tenths by dividing it by 15.

3. Beginning from the line of 12 (apparent noon), measure up the page the hours and tenths derived from the longitude, and through the point thus located draw (or imagine drawn) a line across the page parallel to the hour lines. This line graphically represents Greenwich noon in relation to the local meridian.

4. Refer to the Ephemeris and number the vertical lines of the page to correspond to the successive minutes of the angle in declination which the sun will pass through on the day for which the curve is drawn, progressing from right to left. Write the degrees of declination above. Each ruled square on the page then equals sixty seconds of declination, considered across the page, and an hour of time up or down the page. (This practical method of obtaining solar declinations for use throughout the day with any solar attachment will be found preferable to computation on account of the comparative ease and certainty of getting results. It is understood that the method was devised and brought into use by Mr. Arthur M. Kidder, Supervisor of Surveys of the General Land Office).

5. Place a dot on the line representing Greenwich noon at the proper point to indicate the minutes and seconds of declination of the sun at Greenwich noon of the proper day, as given in the Ephemeris. This can easily be done within 5 seconds.

6. From the Greenwich noon line measure ten hours down the page, and through the point thus located draw (or imagine drawn) a second horizontal line across the page. For convenience call this the 10-hour line.

7. Multiply the "hourly difference," given in the Ephemeris, by 10, and reduce the product to minutes and seconds of declination by dividing by 60. If the sun's declination is increasing numerically (either north or south) the
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declination given for Greenwich noon must be increased by the change for 10 hours. If the declination is decreasing numerically (either north or south) the declination given for Greenwich noon must be decreased by the change for 10 hours. Plot a point for the resulting increased (or decreased) declination at the proper location on the 10-hour line.

8. Draw a straight line exactly through the two points thus plotted.* This line is the graphic representation of the change of declination for the current day, at the rate per hour given by the Ephemeris. For convenience call it the declination line.

9. Take from the table of Refractions in Declination the proper quantities for zero hours (12 M), 2 hours, 3 hours, 4 hours, 5 hours, 5½ hours and 6 hours, for the proper latitude and size of the declination angle, north or south, as the case may be. Interpolation becomes necessary only if an error of 5 seconds or more would otherwise result.

Mark on the straight edge of a slip of paper, a little scale of these refractions, drawn to the scale of the 1-minute spaces between the vertical lines on the page.

From the declination line scale off along each hour line (except 11 and 1) the appropriate distance representing the refraction for that hour. When the sun's motion in declination is northerly (December to June) these measurements must be laid off to the left of the declination line. Conversely, from the summer solstice to the winter solstice the refractions are plotted to the right of the declination line. No inconvenience in plotting is encountered at the equinoxes.

Sketch a curve through the resulting series of points. This curve indicates, by its intersections with the hour lines, for any (apparent) time of day, the proper quantity to be set off on the declination arc of the solar attachment.

*At the solstices June 22 and December 23 the declination line stands nearly vertical. At all other times it slants downward to the left if the declination figures are written to progress from right to left.
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10. Check is obtained by adding to (or deducting from) the declination for Greenwich noon, the change of declination occurring between Greenwich and the local meridian, which is obtained by multiplying the hourly difference by the hours and decimal used in locating the Greenwich noon line. The result should check with 5 seconds or less the declination value of the point at which the declination line intersects the noon line.

11. Meridian observations with the solar attachment must be made by apparent solar time, while the observer’s watch is ordinarily set to standard time. Moreover, United States land surveyors are required to report their observations in mean local time. Hence it will be found very convenient to prepare three-time columns at the left of the page, the first for apparent time, the second for the corresponding mean local time, and the third showing the corresponding standard time.

The Ephemeris gives for each day the “Equation of time” and directs how it shall be applied to change apparent time into mean local time. The change of mean local into standard time is effected as follows: Divide by 15 the difference in longitude between the Station and the Standard time meridian. The resulting minutes and seconds of time should be added to the mean local time Epoch if the station is west of the standard time meridian, and vice versa.

Standard time may then be carried, while both observations and proper records are conveniently and correctly made.

Error of the watch on standard time, if more than a minute, should also be allowed for. Watch error is ordinarily determined in the field by observing the times of the passage of the sun’s west and east limbs across the meridian (the mean of which is apparent noon) and making proper allowance for longitude from the time meridian and for the equation of time. This observation is conveniently combined with the observation for latitude.

The hour circle of the adjusted solar attachment reads apparent time when the line of sight of the telescope lies in the meridian, the latitude and corrected declination have been correctly set off on their respective arcs, and the image of the sun is accurately inscribed by the cross lines of the Bart Solar or the cross hairs of the Smith solar telescope.

The attached diagram represents a page of a note book on which a sample declination curve has been platted.
COMPUTERS FOR FORESTRY MEN

A new series of Computers, of special interest to foresters, has been recently placed on the market.

1. The Ross MERID-I-OGRAPH fixes a true meridian graphically. With its aid anyone who can read an angle can find true north accurately—by measuring the height of the sun. Its use requires no computation, books, attachments: no night work; no mathematics or astronomy. It affords a quick, easy check on all azimuth work. Gives also astronomic time. Accuracy 1' to 2' of arc. Endorsed by officers of U. S. Forest Service. It is a double 7-in. dial, and fits your kit.

2. The Ross PRECISION COMPUTER solves problems like:

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to an accuracy not attainable heretofore in a practical way. It is believed to be the most accurate graphic computer; it reads 5 figures; is about 100 times as accurate as the slide-rule, or equal to a slide-rule 100 feet long. It is an 8½-inch dial, with a handle, framed in aluminum, and fits your kit. Those who require an accuracy of at least 4 figures exact, or 5 in all, will find the Precision Computer indispensable.

3. The Ross RAPID COMPUTER is most simple and rapid. Anyone who can read numbers can use it instantly. It is much more simple than the slide-rule, and more accurate. It figures traverses, stadia, angles; stumpage, acreage, yield; multiplies, divides, and in every case proves its own answers. It is made of weather-and-wear-proof celluloid, not liable to injury in field use. Made in 2 sizes: a 6-inch computer to fit the pocket; and an 8-inch computer, more accurate and much more legible, for desk use.

The prices range from $4.50 to $20.00. Those who wish to know how to apply these Computers to their own particular, individual needs, should write to the Computer Mfg. Co., 25 California St., San Francisco, asking for Folder K.
Deductions for Defects in Log Scaling

Compiled by District One, U. S. Forest Service

The effect of rot and other defects upon logs of different species and in different regions varies so greatly that no rules for making deductions can be applied inflexibly. The constant exercise of good judgment by scalers based upon an accurate knowledge of local timber is essential. Scalers should at every opportunity train their judgment in deducting for defects by watching defective logs open up under the saw.

Defects are classified as follows:

1. Interior defects, which cause waste in the interior of logs.
2. Side defects, which cause waste on the outside of logs.
3. Defects from curve or sweep.
4. Defects from crotches.

INTERIOR DEFECTS.

**General Rule.**

Interior defects showing in one or both ends of the log may, for reductions in scaling, be treated as sawed out in squares or rectangles. The Scribner Decimal C rule is based upon diagrams of 1-inch boards with $\frac{3}{16}$-inch kerf. Twenty per cent of any square or rectangle inside the slabbed surfaces of the log is, therefore deducted for kerf in the rule. This deduction is carried in scaling sound timber, and hence should not be included in allowances for defect.

The scaler should first measure the end dimensions of the square or rectangle which will be wasted in manufacture and determine its length. From its computed contents in board feet 20 per cent should be deducted as the scale rule's allowance for saw kerf and the remainder raised or lowered to the nearest 10. The gross scale of the log should then be reduced by this amount.

The substance of this method is to deduct 80 per cent of the board foot contents of a piece of timber having the same dimensions as the defect. The entire process may be stated algebraically as follows: If $a$ and $b$ represent the end dimensions of the defect in inches, $l$ the length of the defect in feet, $Y$ its contents in board feet, and $X$ its contents in board feet after 20 per cent is deducted for kerf, $X$, or the net reduction to be made in the scale, may be obtained as follows:

$$\frac{a \times b \times l}{12} = Y, \quad X = Y - 0.20 \times Y$$

or, reducing these equations to their simplest form,

$$X = \frac{a \times b \times l}{15}$$

$X$ must then be raised or lowered to the nearest 10.

For example, a defect squaring 5 inches extends through a 16-foot log $5 \times 5 \times 16$ = 262.2, or rounded to the nearest 10, 30 board feet, the allowance for defect to be taken from the gross scale of the log.

For example, the waste in cutting out a defect which extends through a $4 \times 9 \times 16$ = 38.4, or 40 board feet, the net allowance for the defect.

Where defects of these classes show in both ends of the log the larger dimensions will be taken in logs 16 feet and under in length, and the average dimensions in logs over 16 feet. If a defect does not appear in both ends of (Continued on Page 108)
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DEDUCTIONS FOR DEFECTS IN LOG SCALING—(Continued)

the log the scaler should estimate its length, taking the other dimensions in full as shown at the defective end.

As explained hereafter, it may be necessary to depart from the general rule in deducting for cat faces and some forms of butt rot.

Center or Circular Rot.

The defect should be squared or inclosed in a rectangle and the proper deduction determined in accordance with the preceding instructions.

Many rules of thumb for determining the deduction for center or circular rot are in common use. These are usually too inaccurate for Service scaling. One of the best which gives results close to those obtained by the foregoing calculation is as follows:

Obtain the average diameter of the rot at each end of the log and average these two figures. Add to the average diameter:

1-3 if it is 12 inches or less.
1-4 if it is from 13 to 20 inches, inclusive.
1-5 if it exceeds 20 inches.

Obtain the scale of a log of this diameter, as extended, and the same length as the log in question. Deduct this amount from the gross scale of the log.

In the case of 16-foot logs only the deduction for circular rot can be obtained by squaring the diameter of the defect in inches and rounding off to the nearest multiple of 10. If the average diameter is 7 inches, for example, its square would be 49, or rounded off, 50 board feet. (Read as 5 in the Scribner Decimal C log rule).

The use of the foregoing rules is authorized if desired in special cases, but the standard practice of the Service will be to deduct for center rot as for other interior defects.

Ground or Stump Rot.

Ground or stump rot in butt logs seldom extends far into the log and usually tapers to a point. If it joins center rot from above or extends well up into the log, the defect comes under center or circular rot.

Where stump rot spreads from the center of the log to within a short distance of the bark, a section of the log containing the defect should be cut out in scaling. Additional allowance should be made as under center or circular rot if the defect extends into the log above the section cut out.

The scaler must exercise judgment in deducting for ground rot, comparing the diameter of the defect with that of the butt and sighting along the log to see if any boards can be cut from sound material outside of the rot. Where this defect occurs on only one side of the butt, it usually extends but a short distance into the log. Much of it will frequently come out in the slab, especially where there is considerable "flare" or swell.

Circular Shake or Pitch Rings.

The standard rule for interior defects should be applied to the material within the outer shake or pitch ring. If there is a sound core of merchantable size inside of the shake or pitch ring, it should be scaled as a separate log. The difference between its scale and the amount of material obtained by squaring the outer dimensions of the defects is the net deduction from the full scale of the log.

The rules of thumb given under "Center or circular rot," apply also to circular shake or pitch rings.

Pin Dote or Peck.

Pin dote or peck appears on the ends of logs as little rotten spots or pockets usually occurring in a roughly circular area. Logs containing it may "open up" poorly, the doty spots frequently converging and forming a mass of more or less broken-down material. It often extends into knots. If the
DEDUCTIONS FOR DEFECTS IN LOG SCALING—(Continued)

area of defect on the end of the log is 4 inches or more in diameter, deduction should be made under the standard rule for interior defects. Defective areas less than 4 inches in diameter can usually be disregarded.

Check on Pitch Seam.

The scaler should first ascertain whether the seam shows at both ends of the log and if it is straight or twisted. The greater the twist, the larger will be the amount of waste. If the seam shows at only one end of the log, the distance which it extends into the log must be measured. The dimensions of waste material in sawing the seam out should also be measured on the end of the log. Deduction for the defect should then be determined under the standard rule for interior defects.
Cat Face.

Proper deduction for cat face can not be made under the general rule for interior defects. The log should be divided into sections, throwing the defect into one section. The scaler should determine what part of the total length of the log is affected, find the contents of this section on his scale stick, and determine the portion of the section which will be lost in sawing. The latter should be deducted from the gross scale of the log.

For example, in the butt of a 16-foot log with a top diameter of 24 inches, scaling 400 feet b. m., there is a cat face 5 feet long extending to the heart of the log. The cat face tapers toward the top where it will come out in slabbing and affects about 4 feet of the log. The 4-foot section affected contains one-fourth of the scale of the log, or 100 feet b. m. The defect will throw out one-half of this 4-foot section, or 50 feet b. m., the amount to be deducted. Here again judgment and knowledge of the timber are necessary. While the defect may extend to the heart of the stump, it may taper rapidly toward the top and perhaps affect only one-third or less of the section.

Dote Appearing in Knots.

Defect in the log is sometimes shown only by rot or dote in the knots. No fixed rule can be applied in such cases. Deductions must be made in accordance with the scaler's knowledge of how such logs "open up."

Dote in knots is an indication of an enlarged area of rot in adjoining portions of the log. When rot appears both at the ends of a log and in its knots, the deduction, depending on the number of knots affected and their size and position, should ordinarily be from 25 to 50 per cent greater than when the ends alone are defective.

Wormholes.

Deductions for wormholes depend upon their number and extent. A few scattered holes can ordinarily be disregarded. Where such holes are so numerous or so large as to clearly call the material affected, deductions should be made as for other interior defects. Knowledge of how wormy logs open up and the number of worm holes admitted in merchantable lumber is necessary for accurate scaling in such timber.

SIDE DEFECTS.

Unsound Sap.

The sound heartwood alone should be measured in logs with a shell of unsound sap.

Sound blue sap or firm stain, not broken down or wormeaten, will not ordinarily be regarded as a defect.

Checks.

Where a number of deep checks extend from the surface toward the center of a log, the scaler will measure the diameter of the sound core within the largest circle which can be described on the scaling end without being seriously cut into by checks. All material outside of this circle should be thrown out as defective. The sound core will usually be measured on the small end of the log. If the core of solid material is smaller at the butt end, however, measurement should be made there for scaling. Deductions for single checks may be made by measuring the rectangle of waste material as in the case of interior defects.

Other Side Defects.

Scalers should not lose sight of the fact that the waste caused by defects on the side of a log is much less than in the case of defects near the center, since much of the unsound material will come out in slabbing, or is outside of the cylinder represented by the top end of the log and its total length. This is especially true of defects on butt logs with considerable flare or swell.

In culling for fire scars which are not classed as cat faces and other side defects, like those caused by lightning, the scaler should determine the depth of the defect. If it will not be cut off in slabbing, proper deductions should be made by measuring the loss in accordance with the rule for interior de-

(Continued on Page 114)
Clyde Logging Machinery

Ground or Overhead or Combined Ground and Overhead Systems of Yarding, With Combined or Separate Loaders

The Clyde system of logging is based upon the idea of reducing waste-time and surplus hands to the practical minimum.

Our yarding machines are built upon trucks and are self-propelling; the ease and rapidity with which they can be moved permits of frequent sets to bring them within the shortest possible distance of all logs.

Our loaders operate on the same track as the cars to be loaded which pass through and under the elevated engine-deck. No blocks or jacks are required—all Clyde loaders are entirely self-contained and operate under their own power.

A rapidly-increasing number of western loggers are applying Quick-Moving Clyde Logging Machines in their woods with Cost-Cutting results.

Send for Full Information

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395 North Eighteenth Street
Portland, Oregon

Head Office and Plant at Duluth, Minnesota

Mention the Kalmia to Advertisers.
THE MONTANA FOREST SCHOOL

The State University at Missoula is located in the heart of the great inland empire timber region.

The School is in the midst of the national forest region and is within 50 miles of nine national forests.

The school is within 100 miles of 17 national forests, two Indian timber reservations, one military timber reservation and the Glacier National Park.

The headquarters of the district forester of District 1 and of the supervisors of three national forests are located in Missoula.

The boundaries of three national forests are adjacent to the school and a forest service lookout station is located on the high summit of Mount Sentinel, a part of the University campus.

The school is organized in the three departments of forestry, forest engineering and the ranger school.

The undergraduate course of four years in forestry trains men for work as forest rangers and forest supervisors in the federal service and for work involving the administration, protection and utilization of forests.

The undergraduate course of four years in forest engineering trains students for all the requirements of engineering work in the forest. Graduates are fitted for employment as scalers, cruisers, forest appraisers, logging engineers, and for all lines of forest improvement work.

The rangers' school offers a short course during the first three months of each year to train men who have already had some experience in woods work to do better work in forestry, and is particularly to improve the training of forest officers. It is not a course for inexperienced men.

The completion of a four years' preparatory or high school course is the standard for regular entrance to the school, as in the other schools of the University.

A limited number of special students may be admitted with the approval of the faculty. Special students must be over twenty years of age, of good character and give sufficient evidence of ability to carry the work. Special students do not receive a degree.
Circular Rot
Stump Rot
Heart Check
Catface
Dote in knots
Decay in overgrowth knot
Worm Holes

Sap partially decayed

Firm blue sap — small checks

Wind Checks
Wind Checks

Section thru Log showing defect inside cylinder.

Ring Rot due to Conks

Rusty Knots in White Fir and Hemlock

(Continued on Page 116)
For a Smooth, Quick Cut

DISSTON SAWs

Built of the finest materials along lines scientifically correct for the intended service.

Result—Run Easiest, Cut Fastest, Last Longest.

Write for Cross Cut Saw Booklet

Henry Disston & Sons, Inc.
Philadelphia, U. S. A.

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The Saw Manufacturer Wants to Know---

He wants to know the name and permanent address of every Forest Service man when he is located and actively at work.

This address will then be put on our mailing lists to receive free copies of the various valuable booklets and circulars we from time to time print on Saws for lumbering.

Saws are one of the elemental and most essential of lumbering tools.

SIMONDS Saws have won and we believe have merited a world wide distinction on account of their high quality.

Our SIMONDS Crescent Ground Cross-cut Saws, our Wide Band Saws, Circular Saws, Inserted Point Saws are the Lumberman’s established standard.

Simonds Mfg. Co.
"The Saw Makers"
FITCHBURG, MASS.
Established 1832
5 Factories 11 Branches

Mention The Kalmia to Advertisers.
facts; or in the case of very irregular patches of waste, by estimating the percentage of the log affected.

The scale is not ordinarily reduced by spiral lightning scars, which do not usually run deep and most of which are removed in slabbng. The percentage of loss is proportionately greater in small than in large logs.

Minimum Length and Width of Lumber.
It is of special importance in deducting for side defects to bear in mind the minimum length and width of merchantable lumber followed in Service scaling.

CURVE OR SWEEP.
The percentage of waste from sweep or curve varies with the diameter of the log. A curve of 3 inches in a 10-inch log will cause approximately twice the proportionate waste as the same curve in a 20-inch log. Sweep which would cull a very small log would not necessarily cause the rejection of a large log.

The scaler should sight along a curved log, noting where the saw will square it sufficiently to cut boards on both sides affected by the curve. In determining the amount of loss it should be remembered that material near the slab saws out narrow boards containing fewer feet than those cut from any other part of the log.

No deduction should be made for curve or sweep in logs over 16 feet long.

CROTCHES.
Except in rare cases, crotches do not affect the scale of logs. If the end or upper portion of a log is badly crotched, proper deduction should be made from its length. In any case where a crotch occurs, the scaler should obtain the average diameter of the log just below the swelling caused by the crotch. This may be done by measuring the diameter at the butt and making the usual allowance for taper.

WHEREABOUTS OF SOME OF THE FOREST SCHOOL STUDENTS THIS SUMMER.
Hugh Kent and Bill Richardson are engaged in making highway surveys for the Forest Service in Northern Idaho.
Sandy Cook is working on the Nelhart Highway project, on the Jefferson Forest.
Henry Hayes will leave in a few days for the Lolo National Forest, where he has been appointed guard.
Webb Jones and W. J. White are on a planting reconnaissance project on the Cabinet Forest.
J. F. Brooks and "Red" Stewart report the snow as being deep on the Flathead Forest where they are working on a reconnaissance job.
C. V. Wingett left the first part of the week to take a position as compassman with Harry Ade, of the District Office on soil classification work.
Stillman Ross is timber cruising for the A. C. M. Lumber Company, in the Thompson River Country.
Kenneth Wolfe will leave the first part of the week for soil classification work in Eastern Montana. L. Sanderson will act as his compassman during the summer.
Peg Lansing will leave immediately after Commencement for the south fork of the Flathead, where he will work as field assistant on control work.
Bill Kane will be sent over to the Clearwater Forest about June 15th on highway surveys. M. Carlson will probably work on the same crew.
C. Carlson is working with Elmer Johnson in Northern Montana on homestead entry surveys.
C. F. Vance is running compass for a Northern Pacific Railway cruising party near Flathead Lake.
Roy Edwards left last week to take a position as Forest Guard on the Coeur d'Alene Forest.
Travel First Class!
THE CLEAN, CARE-FREE MOTOR WHEEL WAY

The Smith Motor Wheel

Brings travel independence. For pleasure and utility it is always at your service.

Power-bicycling, safe and fast, without motor vibration or dirt—that's MOTOR WHEELING—the clean, care-free way of travel!

The SMITH MOTOR WHEEL attaches in a jiffy to any coaster-brake wheel. Your bicycle pulses with new power, after two easy pedal-turns. And then the thumb lever rules.

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This magic motor whips up to 125 miles from one gallon of gasoline. To and from business or pleasure—at six miles for one cent—you ride in comfort and ease. No special togs, for there is no grease and dirt.

The SMITH MOTOR WHEEL takes rough roads and climbs hills with ease, and it is always a constant, willing servant under every condition.

One ride tells the story. Try it at your dealers, or write for "Motor-Wheeling," our free book.

Dealers: There are more than 10,000 happy people Motor-Wheeling in all parts of the country. A few exclusive territories are still open. Write for full particulars.

Motor Wheel Division
A.O. Smith Company, Milwaukee, Wis.
World's Largest Manufacturers of Automobile Parts

Mention the Kaimin to Advertisers.
The Ranger School

A special course for forest rangers is offered in the Forest School each winter. This course usually begins during the first week in January and continues for fourteen weeks. Practical training is given in all the branches of the work of a forest officer.

Opportunities for Specialization

In addition to the work of training Rangers for the particular needs of the Forest School, it is the aim of the Forest School in the University to offer during the period of the School for Forest Rangers special opportunities for specialization in any of the branches of work taught in the Forest School.

Exceptional opportunities are offered for specialization and short course training in Surveying and Mapping and methods of Government land surveys, Scaling and Cruising, Forest Appraisals, Lumbering and Logging Engineering.

Expense of the Ranger School Short Course

The expenses of the course are very small. No tuition is charged. A matriculation fee of $3.00 and an incidental fee of $1.00 are required. Laboratory fees of from $2.00 to $6.00 are required to cover general expenses of material furnished, breakage, wear of instruments and the like. Ordinarily the expenses of the forest ranger for room and board and washing range from $20.00 to $25.00 per month. With ordinary economy the entire course of 14 weeks can be completed at a cost of $100.00 for all school expenses, living expenses and other expenses except purchase of drawing instruments. The purchase of drawing instruments is usually optional with students, and the cost varies from $10.00 to $20.00 for each student. Students who bring drawing instruments and other drafting tools with them do not incur this expense.

Ranger Courses

In the Ranger School the following courses are offered: Surveying and Mapping, 4 cr.; Scaling and Cruising, 3 cr.; Fire Protection, 3 cr.; Forest Improvement, 3 cr.; Forest Administration, 2 cr.; Lumbering, 2 cr.; Botany and Silviculture, 3 cr.; Grazing, 3 cr.; Seminar of General Forestry, 1 cr.

Elective courses are offered to Ranger School students according to the following lists, designed to meet the needs of men who have already had training in the regular courses: English, 3 cr.; Mathematics, 3 cr.; Advanced Mathematics, 3 cr.; Advanced Topographic Surveying and Mapping, 2 cr.; Hydraulics, 1 cr.; Logging Engineering, 3 cr.; Geology, 3 cr.; Insect Control, 3 cr.; Tree Diseases, 3 cr.; Forest Appraisals, 3 cr.; Grazing, Breeds and Breeding, Diseases, 2 cr.; Physics, 3 cr.; First Aid, Camp Surgery and Medicines, 1 cr.
A PIPE of VELVET is a great teacher. When a man's smokin' he ain't called on to talk so much. He gets a chance to listen some.
The University of Montana

The University of Montana is constituted under the provisions of Chapter 92 of the Laws of the Thirteenth Legislative Assembly, March 14, 1913 (effective July 1, 1913).

The general control and supervision of the University is vested in the State Board of Education. The Chancellor of the University is the chief executive officer. For each of the component institutions there is a local executive board.

MONTANA STATE BOARD OF EDUCATION

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The University comprises the following institutions, schools and departments:

THE STATE UNIVERSITY at Missoula.
Established February 17, 1893, and consisting of:
The College of Arts and Sciences,
The School of Law,
The School of Pharmacy,
The School of Forestry,
The School of Journalism,
The School of Music,
The Summer Session,
The Biological Station, (Flathead Lake)
The Extension Service,
The Graduate Department.

FREDERICK C. SCHEUCH, Acting President.

THE STATE COLLEGE OF AGRICULTURE AND MECHANIC ARTS at Bozeman.
Established February 16, 1893, and consisting of:
The College of Agriculture,
The College of Engineering,
The College of Applied Science,
The College of Industrial Arts,
The School of Home Economics,
The School of Mechanic Arts,
The School of Agriculture,
The School of Art,
The Secretarial Course,
The School of Music,
The Summer Session,
The Agricultural Experiment Station,
The Agricultural Extension Service.

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THE STATE NORMAL COLLEGE at Dillon.
Established February 23, 1893, and consisting of:
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The Three-year Course,
The Four-year Course,
The Graduate Course.

JOSEPH E. MONROE, President.

For publications and detailed information concerning the different schools and colleges, address the President of the particular institution concerned. Communications intended for the Chancellor of the University should be addressed to the State Capitol, Helena, Montana.

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H. H. Bateman Company
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Agents for the Famous MONTANA RANGER Drawing Instruments

We handle drawing instruments and supplies for the men engaged in woodwork. Will send you postpaid:

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17 degrees from 6H to 9H.

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OUR STOCK IS ALWAYS COMPLETE IN ALL RULINGS

Level - Transit - Field - Cross Section
Full Sheep Binding: $0.75
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We carry the largest and most complete stock of general office appliances in Western Montana, and solicit your patronage. Mail orders receive prompt attention. Complete catalog gladly mailed on request.

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MISSOULA

A modern city in the heart of a primeval wilderness. Hundreds of miles of teeming streams are within easy reach of Missoula. Deer, elk and bear abound in the mountains. A dozen lakes, countless creeks and rivers afford ideal camping places, deep among majestic hills, away from any human sign.

VACATION

Mention the Kaimin to Advertisers.
Flathead Lake is but a few hours from Missoula and just beyond is Glacier National Park. Here is the finest vacation spot in America. Bright sunshine, sparkling air, clear water and all the strengthening delights of a mountain wilderness are here, to be enjoyed, if you wish, among metropolitan comforts, or the wilds.
This store with its many completely stocked departments presents every facility for outfitting for field work and affords a convenient center from which to draw supplies as needed.

Many of the lines specially advertised in this annual will be found here in regular stock, while we are factory agents for many others.

Here you will find a full line of K. & E. draughtsmen's tools and drawing materials, including drawing instruments for topographic work.

Here you will find everything in the way of camp equipment, from tin cups to tents, camp furniture, bedding, portable houses, etc.

Here you will find guns and revolvers in all makes and models, ammunition, and everything else that goes with them.

Here you will find kodaks, films and photographic supplies. Thermos bottles, etc.

Here you will find groceries and provisions.

Here you will find riding and pack saddles and all accessories.

Here you will find a specialized clothing service for the outer; regulation foresters' suits, all manner of khaki clothing, flannel shirts, service hats, etc.

Here you will find mountain boots in many styles, puttees, leggings, as well as footwear of every other description.

In all departments incomparable service, a knowledge of requirements and goods of quality.
University of Montana
STATE UNIVERSITY
MISSOULA
SUMMER SESSION, 1916
JUNE 19 TO JULY 29

Registration for the Summer Session will be held June 19 and instruction will begin June 20.

Purposes:

The courses of the Summer Session are designed to meet the needs of the following:

School superintendents, principals and teachers connected with either grade or high schools who desire to become more familiar with the recent progress of education; college students who wish to shorten their university course; and those preparing for state and county examinations.

While the leading purpose of the Summer Session is the professional and technical training of teachers, good facilities are offered for those who wish to enter upon other fields, such as law, journalism, commerce and accounting, library science, and home economics.

Courses:

Biology (at Flathead Lake), botany, commerce and accounting, conciliation and international polity, county library administration, domestic art, domestic science, dramatic art, economics, education, English, fine arts, French, geology, German, handicraft, history, history of Montana, journalism, law, literature (English and American), library science, mathematics, mental measurements, methods in teaching, music (vocal, violin, piano), physics, physical education, physiology, playgrounds, political science, psychology, public speaking, reading, sewing, Spanish, sociology, stenography, and supervised play. Courses in which five or more students are not enrolled may be omitted.

The following among other lecturers will address the Summer students: Dr. Edward C. Elliott, Chancellor, University of Montana; Samuel V. Stewart, Governor of Montana; H. A. Davee, Superintendent of Public Instruction of Montana; John Dietrich, Superintendent of Schools, Helena, Montana; Ward H. Nye, Superintendent of Schools, Billings, Montana; Dr. James H. Durston, Editor, Butte Evening Post, Butte, Montana; Dr. Henry Suzzalo, President of the University of Washington; Dr. E. O. Sisson, Commissioner of Education, Idaho; Dr. M. A. Brannon, President of the University of Idaho.

The Biological Station at Flathead Lake:

The Session will continue nine weeks, or until August 20. The courses offered include, botany, zoology, entomology, ornithology, ecology, photography, plankton, with opportunity for research.

For bulletin of information address:

J. P. ROWE
Director, Summer Session,
State University,
Missoula, Montana.

Mention The Kalmin to Advertisers.
Our Advertisers

Five thousand copies of this Journal are being mailed to foresters, lumbermen and others interested in forestry. We aim to reach every forester and every forest officer in the United States. If you did not receive a copy for yourself write for one.

Our advertisers make this publication possible. We stand back of every advertisement in this magazine. Only advertisements from reputable manufacturers and dealers of national reputation have been accepted. If you write to an advertiser, mention the Forestry Kaimin. It will make possible, next year, the publication of a bigger and better journal of wider circulation.

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Opportunity for special research work, leading to advanced degrees in

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