THE MISSION OF THE SEA.

Men gain new vigor at her wholesome breast;
She links far lands and reunites fond hearts;
She carries argosies from East and West
To those of distant parts.

But more than this, her mission unto us,
The mission of the many-voiced sea!
She rolls her ceaseless waves to shore, and these
She types Eternity.

—*R. E. Burton, in Youth's Companion.*

"OLD STEADY'S" GAME.

BY EVELYN HUNT RAYMOND.

"Set thar, stranger. Mebbe you'll light? No? Humph! Life 'd be too ornery flat without my 'baccy, an' it's no gret, anyhow."

"That's as we take it; but this is a lonely place. How did you happen to settle here?"

"None o' yer—no matter. Only folks 'round this canon don't ask too many questions. 'Tain't considered good luck, not ter say healthy."

"Beg your pardon; however, no offense was intended."

"Don't say no more—shake. Polly, bring the victuals."

Polly obeyed, the traveler watching her attentively. She was one of the sights he had come to see; an institution of this West which was so full of interest to him. Tall, lithe, graceful, limpid-eyed, clear-skinned, spirited and ignorant.

She felt his eyes scanning her, and a flush rose under the tan of her cheek. For the first time in her life she was unpleasantly conscious of her bare feet—brown and shapely though they were—and the feeling gave her head a higher poise. It may have been that that made her stumble and spill the contents of her earthen bowl over the guest's knees, as she passed him in the narrow space before the deal table.

The flush deepened, and a quick tear of anger sprang to the dark eye; she faltered—half meaning to apologize—but an oath from her father checked the incipient courtesy, and turning, she left the cabin. A moment later Barr caught a gleam of pink calico behind a pile of rocks.

Old Stinson also saw it, and sighed.

"Don't wonder ye say 'tain't fit. My gal, thar, ain't no chance. She's smart—smart as a full-blooded filly. She'd orter ben sent East; but she won't leave her old dad. Rough as I be, she sticks ter me. I orter be shot fer cussin' her. Wall, I ain't what I wus; settin' here watchin' an' keepin' gyard makes me narvous."

The visitor's eyes asked the question from which his lips refrained.

The simple dinner eaten, the remnants were left to the flies, and the men's chairs tilted back against the outside of the hovel. Something in the younger one's frank face and manner had softened "Old Grizzly" to a reminiscent mood, and made him strangely inclined to gratify an idle curiosity.

Sage bush, rock, and alkali. The shadow of the rude home stretched out longer; from its shelter John Barr looked over the wilderness, and wondered where in its vastness he should find the man he sought.

"Stranger, I've took a notion to ye. Ye've got a motion 'bout ye 't 'minds me o' one I knowed. Ye look like an honest chap. Say! d'ye believe in ghosts?"

He put the question suddenly, eagerly; and a look of grieved disappointment followed the "Not at all" with which it was received.

"Do you?"

"Yep. I've seen 'em."

A thought had come to the other, pityingly connected with the gleam of pink calico.

There was a long silence. The keen eyes under the shaggy brows fixed themselves intently on the guest who—realizing what a godsend his chance visit must be to this lonely soul—submitted in patience.

"Can't you tell me about it?"

"I'd be glad ter—plagued glad! Ef ye'll swar on yer derringer 't ye won't blab."

The temptation to smile was banished by the thought of that unshed tear in Polly's dark eye. Humoring the old man might help her.

"I'll swear," he said; and he did.

"D'ye see yender stun with the pile o' dead bresh 'round it? an' the heaps o' rocks jest beyand?"

"Yes."

"Thet's the spot. Thet's what I'm a-watchin', an' hev got ter watch till the owner comes. Stranger! I'm a sure shot. I don't bar no foolin' with. Ef ye betray—"

"I shall not betray you."

"Wall, I ain't easy mistook a-readin' men, an' I'm a-goin's ter trest ye. I've got ter, somebuddy, soon. Thar's a queer kind o' pain in my side 't warns me. Twic't I've lost my senses, an' when I come to I hedn't so much stren'th as a baby coyote. I'll lose 'em onct too often, and then—"

"I ain't never told Polly yit. I've kinder hated ter. Women is narvous, an' I've been a-gittin' that way myself nuff ter know what a mis'able feel it is.

"I hed a pardner onct; as squar' a man as ever handled a pick. He hailed from Boston, and 'twas quite a change, ye'll 'low. He never told—an' I never ast—what wus the prime cause 't druv him ter the Rockies. Thar's allus sumthin'.

"We warn't much alike. He wus sober as a jedge, an' I liked rum. 'Ol' Grizzly' an' 'Ol' Steady' thet's what the boys called us, an' we wus lucky.

"When we'd got a good pile we'd make an even divvy; then I'd saddle my mare an' take the trail fer 'Frisco, but he'd stay here 'long o' Polly.

"He 'tended the ol' woman when she petered out, an' done more ter comfort the young un 'an I could. 'Twus 'bout the same's her hevin' two daddies.

"I'd allus stow some o' the dust whar Polly'll find it arter I'm gone, an' then I'd help the boys ter hev a good time. Whenever I come back—arter six weeks er six months—I'd find 'Ol' Steady' goin' on jest the same. But onct I see in a minute't he'd struck his last payin' quartz.

"Dunno what ailed him, an' smart's he wus, he didn't; but he told me he'd quit diggin', and afore he hung up his tools fer good he'd show me whar he'd stowed his pile.

"'Twas all fer 'his boy,' 't wus ter a college out East, an' I wus ter hand it over on demand.

"He writ a letter—I ain't never larned ter read, no more has Polly—ter tell all about hisself an' what he wanted done; but blest ef he didn't drap off suddent one night, an' never no chance ter tell nothin'.

"Some o' the boys helped bury him, an' we fixed him comfor'ble an' solid, with a stun ter his head an' his feet. Warn't none o' us much fer prayin', so the young un, she kneeled down thar an' said the pra'r he'd larned her himself.

"'Twus orful lonesome arter thet, an' the gal cried a lot; but I ain't never ben the same man sence.

"'Twus in my mind allus, whar 'd 'Ol' Steady' planted his gold! An' how wus I ter be as true ter him an' his'n as he'd ben ter me an' Polly?

"I couldn't sleep sca'ce none, an' one moonlight night I went outside an' walked all 'roun' the gully. When I come ter thet thar heap o' stuns, as sartin as ye're a sinner, thar sot 'Ol' Steady' on a bowlder playin' cyards all by hisself!

"He'd ben a marster hand fer solytary when he wus 'bove groun', an' it 'peared he hedn't lost none o' his grip down below. I turned all kinder cold, but no livin' man 'd ever downed me, an' I 'lowed no dead one shouldn't.

"'Hello, pard!' I hollered. He never let on, but jest kep' a-sortin' an' handlin' his cyards same 's he'd allus done. Somehow my legs felt heavy as lead, but I kep' on a-draggin' myself nearer, till all of a suddent he wus gone!

"I didn't tarry long, nuther; but tumbled inter my bunk an' cussed myself fer a blamed fool.

"Nex' night, sunthin' 't I couldn't help fa'rly drug me out o' the cabin agin' an' 'roun' an' 'roun' till I brung up ter the same pile o' stuns, an' ther—thar it sot agin, 'big as life an' twict as nateral.'

"I started fer him—it—plumb straight, but fust I knowed, thar wus my feet a-lagin' agin 's ef they b'longed ter somebuddy else. Thet time, though, I edged a leetle clusser, an' spoke out good an' gritty.

"What's sent ye back, Ol' Steady? Didn't we do the plantin' job all reg'lar?' He wavered, an' twisted, an' squirmed 'roun' consid'ablt, an' then—he warn't thar!

"Thet blamed thing went on fer seven nights; me a-gittin' madder an' it a-gittin' sassier an' stayin' later till I got so clus' I could a'most tech it.

"The las' one, I got a good look over his—its—shoulder, an' blest if ever' one o' them spook cyards warn't spades—aces o' spades! I couldn' help larfin'. 'Say, pardner! whar'd ye git thet pack; be they from above er below?'

"He didn't take no notice, jest kep' on a-shufflin' an' dealin' 'em out on thet bowlder, one arter another, ace arter ace. We begun these pertracted meetin's when the moon wus in first quarter, an' now 'twas later 'n later ever' night afore he'd come ter time. I thought I'd settle the hash then an' thar.

"'I ast ye onct, pardner, what sent ye back, an' now I ax agin'.' I'd ben doin' considerable thinkin' an' cal'lated I'd struck a lead at last. 'Wus it 'cause ye didn't git no chance ter tell 'bout yer pile?'

"Thet spook stopped shufflin' an' raised its head ter onct. I follered up the trail. 'Ye don't play nothin' but spades. I reckin thar'll be some diggin' ter do.'

"Ol' Steady's eyes looked from his aces inter mine. I thought a blizzard 'd hit me; but I braced up onct more. 'Be—ye—a-settin'—on—the—spot—pard?' I chattered.

"Hope ter die ef he didn't smile! The gladdest, relievedest 't ever ye see. It made him look so peart like 't I clean fergot 't he'd ben dead an' buried, an' I wus so tickled ter think I'd foun' out what he wanted, 't I jest clapped my han' down heavy on his shoulder! Thet is, I clapped hearty nuf, but thar warn't nothin' ter hit but the stun whar he'd sot."

The miner relapsed into revery, a peculiar smile hovering over his stubbly lips. John Barr was smiling, too; the mingled pathos and bathos of eerie tale amused while it touched him.

His host suddenly looked up and fixed anew his piercing gaze upon him. The scrutiny was again sustained in perfect calmness. If it was a madman with whom he had to deal he would be prepared.

"Thar, stranger! I don't in common ax no questions o' them 'at eats my victuals—who they be ner whar' they're a-goin'. But I dew now. What's yer name?"

"Pardon me, I forgot; I should have told you at first. John Willett Barr."

The settler stood up, put his scrawny hands to his mouth, and blew a shrill whistle. At the third repetition an answering salute was heard, and the pink-calico gown came in sight.

The oval cheek was redder from shame than exercise, as the girl advanced to her father's side. She had not meant again to face this guest who had witnessed her poverty and awkwardness, but she dared not disobey.

"Polly, hev ye got the letter safe?"

"Yes, pop."

"War'?"

She raised her dark eyes and searched both countenances with grave questioning.

"What fer ye want ter know?"

"No matter. I want it."

"Fer him?"

"Thet ain't nothin' ter ye."

"Yes, pop, it be. I promised ter keep it till his own 'boy' come from the States. I promised agin thet last day. Don't ast me ter give it up ter nobuddy else."

"Young un', what wus 'Ol' Steady's' name? He larnt it to ye so 't ye could spell it out like a scholard."

"I don't see no call——"

"Say it, I tell ye. Don't ye dar' go agin' me!"

The impatient words were addressed to the reluctant girl, but "Ol' Grizzly's" eager gaze was on the stranger's face.

With slow distinctness, feeling herself a traitor to a sacred memory she pronounced the words:

"John—Willett—Barr."

The traveler paled from the shock, whose truth was sadder than he had dreamed. A moment later he had disappeared in the canon.

"Daddy, what fer did ye make me? I warn't ter tell nobody but the 'boy.'

"Yender's him?"

"Him! Oh, Lordy!"

To both minds returned the same picture—the poor and barren death-chamber of "Ol' Steady," his vein efforts for speech, his hopeless longing for the loved presence which had come—too late.

The moon had risen when Barr returned to the cabin. By the light of a kerosene-lamp he saw the girl within watching over a bulky envelope which lay upon the table.

She rose to meet him as he came within a few feet of her and paused. Lifting the lamp and shading it with her hand so that the rays fell full upon his features, she examined them even more than his father had done.

She would have risked life to defend, or to deliver to its rightful claimant, her sacred trust.

"Sw'ar ter me, stranger; be you his 'boy?' Be you—John—Willett—Barr?"

The sorrowful regret in the face confronting her was too genuine for further doubting. With a sigh of intense relief she held out her hand and the letter.

He took them both, and with the deference due a Queen bent and touched the brown fingers with his lips. Twice that day Polly's eyes had filled with an unaccustomed mist, but this time she hid them in her chamber.

The old man and his guest sat down outside. Neither was inclined for speech. There would be time for such later—that hour was for silence.

It might have been midnight when the elder's hand reached out and touched the other's sleeve; left it to point silently over the moonlit sward to the pile of rocks bordering the gulch.

The young man's eyes followed the gesture, then came suddenly back and met the triumphant gaze shot to him from beneath old Stinson's beetling brows.

"He ain't sot thar' afore sence I foun' his pile. I cal'lated of ef he wus hisself he'd be on han' ter-night ter meet his 'boy!'"

With arms extended, and a glad cry as of childhood, Barr ran toward the group of bowlders. Dimly, through her healthful slumber, Polly heard that "Father!" and smiled upon her pillow. "Grizzly" heard it, and felt a burden lifted from his faithful heart. The echoes of the cannon caught it up and tossed it back to one another in sweet succession till it died upon the night wind. Did it reach to the hungry heart in the lonely grave, and quiet its unrest? Who can tell?

* * * * * * *

"I dare not, John. We have been so differently trained. You have had a lifetime of learning, I one little year. I am so ignorant! I am not good enough—no, I won't say that! I am as good as you—as good as any of those beautiful women I see; but they are far better fitted to marry you."

A twelvemonth of culture had not detracted from the proud, free grace of the creature who had grown up in the wilderness, and it was quite the old Polly who tossed back her pretty head, folded her shapely arms, and set her chin firmly to withstand her pleading lover.

He came close to her, but he dared not touch her. Once his lips had caressed her fingers; would they ever reach her perfect mouth?

"Darling, what has learning to do with you and me? Shall I tell you what I see, always! A fresh-made grave in a lonely place, a group of rough men, and a weeping girl, kneeling with folded hands and upturned face. 'Old Steady' knows, as I know, that no other than his Polly can be wife to his boy. Come!"

He held out his arms. A moment later, with the slow, sweet yielding of the conquered wilding that she was, she drooped to let them fold about her.—*Frank Leslie's.*

Washington a Cheap Place to Live In.

Washington strikes the stranger from the North as decidedly a cheap place to live in. Meat costs thirty per cent. less than in Boston, and marketing of other sorts is lower in about the same proportion. There are only two dear things here, apparantly—ice and ashes. The former is expensive, because it has to be brought all the way from Kennebec, or manufactured artificially. The latter costs ten cents a barrel to get rid of. The city will not take them away, and so, to dispose of them, one must needs engage the services of one of a number of colored gentlemen who have created, by an understanding among themselves, a sort of "ash trust." They will take nothing less than ten cents a barrel for removing your ashes in dump-carts, which they drive about the town, making such collections. You must take your choice between employing them and storing your ashes in the cellar. Count up the number of barrels of ashes your domestic establishment will produce in a year, and you will find that it is quite a tax, incidentally, also, you will discover one reason why the colored men are able to afford to occupy shanties all over the most fashionable part of northwest Washington, on land of their own that is worth $5 to $6 per square foot.—*New Orleans Picayune.*

Electric Lights for Convicts' Cells

The cells of 700 convicts in the Northern Indiana Penitentiary, at Michigan City are now illuminated by electricity. The Board of Directors have adopted the incandescent sytem. Every cell has one lamp. The convicts have heretofore been allowed candles, but under the new method of illuminating the officers will have the assurance that all lights are extinguished on time.

THE FARM AND GARDEN.

RAISING TURNIPS FOR SEED.

In Pennsylvania, where the growing of turnips for seed is a great industry, the seed is sown between the rows of corn, after the last working. This gives turnips about two inches in diameter, the most desirable size for seed purposes. In this manner a good crop is secured at a nominal cost, as they require no work after sowing. Sufficient roots can be grown with an acre of corn to set three acres for seed the following season.—*American Agriculturist.*

PROTECTION THAT PAYS.

Mulching wheat fields in the fall after seeding has been much experimented with under our observation, and it is decided to be eminently advisable. Fine material, thinly and evenly spread, generally prevents winter-killing, and it increases the crop over that which is neither mulched nor affected by alternate freezing and thawing. For this purpose buckwheat and other chaff is excellent; the partly rotted refuse of old stack-bottoms, and any short litter raked up about the barns and sheds, and short clover and buckwheat straw answer well. Long straw may be better than nothing if thinly spread, but that is a difficult matter. A person tried it, put on too much, and the wheat came up spindling and the crop was poor. Long straw chaffed by running it through a cutter would be excellent. It is suggested that forest leaves, especially if partly rotted, would be as good as anything. The mulching should be done immediately after seeding.—*New York Tribune.*

DIGGING AND STORING POTATOES.

The early crop is often injured by delay in digging. As soon as the vines are dead the potatoes should be dug and stored. Every one knows that a potato in the spring when it has started to grow and pushed its sprouts becomes of inferior quality for the table; its starch becomes changed into sugar and other principles which feed the growth of the leaves, and the tuber becomes soggy and of poor quality. When the early potato becomes ripened, the top or vines die down and a long period of dry weather completes the ripening and the tubers should be dug and housed. If, after a dry season, a wet one follows, a long warm rain starts the tubers into growth, not a growth of stems and leaves, but a kind of growth which often takes place when potatoes are stored in too warm a place, called "supertuberation." In this the material stored in the tuber for sustaining the growth of the following year is started and used for the formation of new small tubers. Most observing farmers must have found in their potato-bin toward spring new potatoes produced from the material of old tubers. Potatoes should be dried off before they are stored, and in doing this they should not be exposed to the sun. The old farm-house cellar, which is being abandoned as a storehouse for potatoes and other crops has an advantage as a place for storing potatoes, as the odor which attends the destructive disease may be noticed at its appearance and the affected potatoes removed.—*American Agriculturist.*

ADVANTAGES OF CLOVER.

Clover has a beneficial effect upon the soil in two ways, and is not only grown cheaply, but it yields a valuable crop for hay or pasture. It shades the soil and mellows it, and this is beneficial by encouraging the natural nitrification of organic matter that may be inert in the land. It produces a large quantity of roots, which contain nitrogen in abundance, and yields a feeding crop which is worth, for the nitrogen not used up by the stock and left available in the manure, at least $10 per ton, as valued on the basis of the cost of the nitrogen in artificial fertilizers. After a crop of hay has been taken for two years the second year the aftermath yields enough seed to stock the land for years when it is turned under, and an amount of most useful plant food equivalent to ten tons of the best barn manure per acre. A fair yield of aftermath, with the roots and debris of the previous hay crops—not counting the manure made by feeding two crops of hay, which in all is estimated by the noted expert Sir J. B. Lawes as equal to more than $10 per ton of hay fed—would contain at least fifty or sixty pounds of nitrogen per acre (and at the most three times as much), which is equal to sixty-one or seventy-three pounds of ammonia, and is worth at the market value of fertilizers seventeen cents per pound. In all, with the manure value of the hay and the fertilizing value of the roots and aftermath turned under, each acre of land under this crop gains in available nitrogen about 180 pounds.—*New York Times.*

DECENTLY DRESSED.

A well-dressed farmer called on business at the boarding place of my son in town, says a farmer, in the New York *Tribune*, and, after leaving, the gentleman of the house was told by my son that the caller was a farmer, when he exclaimed, "He's no farmer!" Of this farmer I once heard the remark that "he always looked as though he had just come out of a band box." Now, I happen to know that this dress was inexpensive, and devoid of foppery or show; only plain, neat and clean, and he always wore a collar and necktie when visiting or on business. Evidently there is room for improvement in the appearance of farmers when abroad, or notice would not have been taken when one appeared neat and tidy, with collar, etc. Farmers who read this can refer to their own observation whether the appearance of themselves and neighbors is all that it should be at home.

If the children of some fathers and mothers are a little ashamed of their parents' uncouth dress, unkempt hair and general slouchy habit, they do not deserve to be very highly censured. Why should a farmer be stoop-shouldered or of rolling or shuffling gait? His work is no harder than that of many a townsman, who carries his head erect, with a straight form, and walks with something of the martial air, as though the equal of other men. "Nothing which can be won by work in this world," says the New York *Witness*, "can make amends for shortened and enfeebled lives." I indorse this, and contend that we should keep our forms erect, walk as squarely as other men, dress respectably and becomingly both at home and abroad for our children's sake, as well as our own, and dignify, as we may, the most useful and honorable calling in the world.

TO BUILD A SILO.

A subscriber of the *Prairie Farmer* asks for directions how to build a silo. Mr. B. S. Hoxie, a correspondent of that paper, says:

"If the structure is to be detached from the barn, make a low foundation wall, just high enough to prevent any surface water from ever coming in contact with the ensilage. Fill up the floor to the level of this wall, and finish off with clay well pounded down, or a cement of water lime. Next lay your sills of 2x8 in. joist, flat on the wall, and bed them well in lime mortar; have them so firm that there will be no chance to spread or get out of place. On the joists place 2x8 in. studding 16 feet long, as this is a proper height for the silo, and 16 inches from center to center. Toe-nail firmly at the bottom of the sill. The object of placing the studding this distance apart is to accommodate the width of tarred paper; for a perfect silo must be perfectly air tight on sides and bottom. Now put good tarred paper on the inside of the studs, lapping, as it will, so as to make tight work; cover with good, sound matched flooring, and see to it that the corners are made secure, so that there will be no spread, or give, to let in the air. Enclose the outside surface with tarred paper same as inside, and good drop-lap siding, as it is called, or any similar method, being careful to make it tight and firm. The roof is made as any ordinary barn roof, and the building may be finished up on the outside to suit the owner's fancy or pocket.

A very good size for a silo would be 16x32 feet, or if more room is needed, make it longer and put in a cross partition of plank. This partition should be made so it will slip down into place and be held by cleats at its ends. The sides must be secured with one or more iron rods to keep the building from spreading. A convenient size for door would be four feet wide, in one end, and made in sections of two feet each, sliding down in grooves so as to come out from the inside as the silo is emptied. These doors, as well as all inside work, must be made so as to form no obstruction to the settling of the fodder and boards and tarred paper which are to form the cover to the pit. This is one of the cheapest methods of construction, and is essentially as good a one as can be built. If a farmer has stones handy, he can build one of solid masonry, but it would not keep out frost or air better than one of wood. One end of a bay in the barn can be used, by observing the same precautions to have it air tight."

FARM AND GARDEN NOTES.

A small amount of salt should occasionally be allowed in the soft food, should any be given.

Managed properly Guineas are everlasting layers, and their flesh is a unite of the turkey and pheasant.

Waldo F. Brown, suggests that posts which must bear the strain of stretched wire fencing be set with cement.

Sunflower seed properly used makes admirable food for the hens. Mix it with other grain and feed occasionally.

Everyone is studying up science. Scientific farming is the rage. Wonder if a little science in the training of boys wouldn't be a good thing.

If you failed to put turnips, celery or fodder corn on the ground from which you took the early peas, do not fail to keep the weeds from going to seed.

A gentleman says he never bothers with his setting hens. He gives them enough feed to last a week, and water every few days, as he thinks of it. This we call unwise.

Don't wait till the close of the season, then take some little "nubbin" of a cucumber for seed—select now a nice specimen and let it grow and ripen for seed.

Don't let earth or rubbish accumulate around the sills of the barn or sheds; if you do it will not be many years before the expense and trouble of a new sill will have to be incurred.

A farmer who needs two teams during the season of busy work may find much more profit in having a yoke of oxen and a span of horses than in four horses; a question dependent on attending conditions that he should examine carefully with the purpose of deciding wisely.

Good racks for holding hay for cattle, horses and sheep will save a great deal of money and hay over the wasteful plan of feeding the hay on the ground or in troughs where it can be pulled out and trampled under foot. In feeding any kind of food to any kind of stock, avoid a wasteful system.

The cry is for a hog with the old time constitution. Well, we can't have him till we go back to the old time methods, and besides what do we want with him anyway? The hog of the present day has sufficient constitution to carry him to the pork barrel. All the trouble is he is not given a chance to take care of what nature gives him. It is the keeping and feeding that kills the hog of the present day, rather than poor constitution.

Worry Kills, Not Work.

It is not work that kills, but worry. It is not the revolution that destroys the machinery, but friction. Work is good for the soul, good for the body and good for the mind. If you want a good appetite don't worry. If you want to stand well with yourself and the world, and want things to go right in your home and your business, do not worry. If you want to size up 100 cents on the dollar, do not worry.—*Courier-Journal.*

HOW SAVAGES MAKE FIRE.

SOME ACCOMPLISH IT IN FIVE SECONDS.

Fire-Making by Gyration, by Sawing, by Plowing, and by Percussion—Various Methods Described.

Walter Hough, of the National Museum at Washington, has been studying and cataloguing the fire making implements, of which the museum has a fine collection. Believing that nature answers a question only through an experiment, Mr Hough has made fire by the various methods represented in the collection. In speaking to a reporter of the Washington *Star*, Mr. Hough said the common belief that to make fire by rubbing two pieces of wood is very difficult, was erroneous. He had, he said, repeatedly made fire in thirty seconds by the twirling stick and in five seconds with the bow drill.

Mr. Hough in studying and arranging the collection in the museum has classified them under four heads. The first class is fire-making by gyration, embracing the simple two-stick apparatus found among the Indians of North, Central and South America, the Ainos, of Japan, the Somalis, of Africa, etc., and the four-part apparatus, used by the Eskimo and some American Indians. The second-class, fire-making by sawing, comprises the apparatus of the Malays and Burmese. The third class, fire-making by plowing, is represented by the implements used in Polynesia and Australia. The fourth class is covered by the head fire-making by percussion, and in it are included the pyrites and flint of the Eskimo and Indian, and the flint and steel still in use in many lands well advanced in civilization. The simplest method of producing a fire by gyration is by twirling a fire-stick between the palms of the hand. Mr. Hough says there is a great knack in twirling the stick. It is taken between the palms of the outstretched hands, which are drawn backward and forward past each other almost to the finger tips, thus giving the drill a gyrating motion. At the same time a strong downward pressure is given, which may be called a rotating pressure. The hands move down the drill; when they nearly reach the lower end, they are brought back to the top with a quick motion. This rotation is repeated as rapidly as possible. When the motion begins a light colored powder, ground off, begins to collect in the slot. Soon the powder gets darker, the smell of burnt wood is noticed and smoke is seen. Probably by the next turn there will be a little curl of smoke of peculiar coloring, showing that active combustion had begun. The little pellet of ground-off wood may now be shaken out of the slot. At first it is dark and a thin line of smoke comes from it; gradually the fire spreads through it until it glows a live coal. It is in this semi-charred dust that heat is held until it increases to about 450 degrees or higher. Everything depends on keeping the dust in a heap; it is impossible to make fire without doing this. With the bow drill the case is similar to that described. In the sawing method the dust falls through the small hole worn by the knife. In the plowing method the dust is pushed along until it forms a heap at the end of the groove. By examining many specimens of fire apparatus Mr. Hough has found that the fire drill to be effective must meet several requirements. Either the drill or the hearth must be of dry, inflammable wood. Wood that is "punky" or soft from incipient decay is generally chosen, most often pieces riddled by worms. Wood of this kind is not only easier of ignition, but it is ground off easily, and is more capable of retaining the heat generated by friction until it accumulates sufficiently to ignite the powder. The Eskimo has, to a great extent, emancipated himself from the necessity of using any particular kind of wood by the invention of the compound drill, by which he gets strong pressure with high rate of speed, thus generating enough heat to fire wood quite intractable by the simple two-part drill. This invention was necessary from the conditions in the Eskimo's frozen home, where drift-wood is mainly depended upon. The Eskimo, however, always secures a piece of good soft wood when he can. Mr. Hough thinks the simplicity of the thing itself and its wide distribution among the tribes of men argue in favor of the claim of the twirling sticks for priority of invention over the more complex flint and pyrites method.

The aborigines of Australia cut with a hatchet a hole in a dry, fallen tree. This hole they fill with a powder made by crushing between their hands the dry ripe head of the flower stalk of a certain plant. Then they turn the stem head downward into the hole and twirl it. A few seconds suffice to get fire. A tribe in South Australia obtain fire by using the grass tree. A split piece of the flower stem of the grass tree is placed upon the ground, the flat side uppermost. A thinner piece is held between the palms of the hand, the lower end being pressed upon the piece on the ground, and an alternate revolving motion is given to it by rubbing the hand backward and forward until the wood ignites. In Java, too, fire is sometimes produced by friction. D'Almeida, describing a journey in Java, says: "Before starting on our return I felt desirous to smoke a cigar, in order to 'keep the cold out;' but finding I had forgotten my fusees I asked one of the men if he could give me a light. He immediately picked up a dry piece of wood, and, holding it fixed on the ground, asked one of his companions to rub another across it. This being quickly done, in less than five minutes the friction caused the upright piece to burn. The man soon blew it into a flame and handed it to me. Travellers say that the Maori gets fire by using the wooden knife. He pushes the knife backward and forward along a groove previously made in a flat piece of wood, and the fine charcoal dust which collects at the extremity of the groove when ignited is placed in a lump of soft flax and waved to and fro until it bursts into a flame.