MISCELLANEOUS INVENTIONS.

A machine for sawing lumber or boards into certain standard lengths known in the trade, as, for example, "twelve-foot" lengths, "fourteen-foot" lengths, or lengths denominated by the number of feet, has been patented by Mr. Willard B. Swartwout, of Three Rivers, Mich. The invention consists in a novel arrangement of certain devices, whereby provision is made for automatically feeding the lumber to the saws and adjusting the saws so that they will cut the lumber in the desired lengths.

An improved flushing valve has been patented by Mr. David Thompson, of Leeds, County of York, England. This flushing valve is for use with water closets and at other places, combining simplicity and certainty of action in the supply of a definite and exact quantity of water each time the handle is lifted, whatever the extent, height, or time of lifting may be, and the prevention of any increased supply, however long the handle may be held up. The invention consists in the combination, with a valve, of a float and ratchet, whereby the closing movement of the valve is governed.

Mr. Charles M. Tyler, of Indianapolis, Ind., has patented a bill file constructed of a spring wire, having one or more ring-coils and one or more slotted elastic holders for paper fasteners, whereby bills and other papers can be securely held and readily fastened together.

An improved washing machine, patented by Mr. Harrison Anderson, of Eddyville, Iowa, consists of a tub, a skeleton cylinder pivoted in the tub to receive the clothes, and a beating mechanism to knock the clothes back into the water as they are raised by the revolution of the cylinder.

An improved mitering machine has been patented by Mr. Theodore E. King, of Westport, Conn. This invention consists of a pair of upright jaws for guiding the saw, which jaws are mounted on the extremity of a pivoted lever that is attached to the under side of a suitable bench or support, the construction being such that when the lever is moved laterally by the operator the guide jaws and saw will be correspondingly moved, so that the angle of the miter may be quickly changed, as desired.

A novel tool handle attachment has been patented by Mr. John L. Coleman, Jr., of Wattsborough, Va. The object of this invention is to provide an attachment for handles by means of which all farm tools, such as shovels, hoes, forks, and the like, may be attached to and used with the same handle. The invention consists of a slotted semi-cylindrical head, in combination with a diagonally-bored handle socket having a concaved end in which the semi-cylindrical head fits, the tools being provided with suitable shanks for engagement with a T-headed bolt or rod which passes through the slot in the head and the diagonal bore in the socket and receives a nut above a shoulder formed on the upper side of the socket, against which the nut comes for tightening and holding the tool securely.

An improved ankle support for skates has been patented by Mr. Ellwood G. Macomber, of Portsmouth, R. I. The invention consists in providing the forward edge of the heel plate of the skate with a socket, in which is secured the bent lower end of an upright rod, to the upper end of which is attached a divided leg band, one leaf or section of which is closed by the pressure of a spiral spring carried on the upright rod, the degree of pressure of the spring being made adjustable, as desired.

A safety snap hook which may be quickly and easily attached to a leather rein without the use of brads or thread, has been patented by Mr. Winfield S. Truitt, of Weston, Ky. The invention consists in two hooks combined in a peculiar manner, and provided with serrated clamping jaws for attaching it to a leather rein.

An improvement in portable fences has been patented by Mr. Joel Heacock, of Marlborough, O. The object of this invention is to improve the construction of the fence for which Letters Patent were granted to the same inventor January 18, 1881. The improvement makes it stronger and more durable.

Mr. Charles T. Wright, of Bodega, Cal., has patented an improved crank handle. The object of this invention is to facilitate the attachment of handles to hand wheels or cranks of machinery of any description, and to provide means for the lubrication of the internal parts of the handles, which are constructed to avoid blistering or otherwise injuring the hand of the operator. The invention consists of a handle hollowed longitudinally and containing a headed bolt, the shoulders of the head of said bolt acting against shoulders formed by an enlargement of the cavity in the handle, which enlarged cavity is closed by a screw plug or cap at the outer end of the handle, the inner end of the headed bolt carrying a jam nut and an outer nut, between which the crank is held, an oil chamber being also provided between the outer cap and the head of the bolt.

Mr. Sewell J. Cilley, of Gonic, N. H., has patented an improvement in belt pulleys, which consists in forming the periphery of the pulley with holes, passages, or ducts for the escape of air from between the belt and the pulley and to roughen the surface of the pulley to increase the frictional contact of the belt. The invention also consists in grooving or incising the periphery of the pulley from or near the center of the belt surface diagonally to the edges to decrease the tendency of the belt to run off from the pulley.

A drawbridge which can be readily operated, and will be equally balanced and self-sustained when partially or wholly opened in a manner to relieve the main bridge from lateral strain and rack, has been patented by Mr. Elias A. Wible, of Brighton, Cal. The invention consists in a double draw composed of two hinged sections operated simultaneously by cogged segments, also in a system of bracing whereby the weight is equally divided and balanced.

Malleable Cast Iron.

A recent number of the *Polytechnisches Notizblatt* contains the following brief description of malleable cast iron, its history, preparation, and properties:

The discovery that cast iron could be rendered malleable and tenacious by a subsequent withdrawal of the carbon, was made more than two centuries ago, but seems to have gradually sunk into oblivion and been forgotten. This seems almost incomprehensible in comparison with the great advantages offered by this material. When we contemplate with what difficulty wrought iron can be shaped and converted into complicate forms, and, on the other hand, how almost absolutely useless cast iron is for parts of machinery, owing to its being so brittle, we might have supposed that the discovery of a material in which should be united the advantages of both without possessing their disadvantages, would mark a new era in mechanics. Nevertheless the discovery had been in so far forgotten that at the beginning of the present century it was patented anew in England, and from that date its production was slowly revived.

It is well known that the brittleness of cast iron is a result of the high percentage of carbon that it contains, and which at the same time renders it fusible. The small quantity of carbon in wrought iron causes it to be very tenacious and tough, but unfortunately injures or destroys its fusibility. The manufacture of malleable cast iron consists in removing a portion of the carbon from the finished article after it has been cast in the desired form. This is done in what is called a tempering furnace, where the casting is placed in contact with some substance rich in oxygen, and then heated to a red heat. The carbon of the iron unites with the liberated oxygen and escapes as carbonic oxide gas, and the result is a material poorer in carbon and consequently extraordinarily tough.

For the purpose of tempering the pieces of cast iron are put in a cast iron vessel on a layer of this oxidizing substance and the intervening spaces filled with the same. Among the substances employed for oxidizing the carbon are the oxide of zinc, brown and red hematite, and hammerslag or scales, the red hematite being the most frequently used. The duration of the process varies between twenty-four and ninety-six hours, depending first on the dimensions of the casting to be tempered, and, secondly, upon the degree of softening desired. The limits in this latter respect are very wide, since with proper mixtures of iron it is possible to absorb all the carbon, or all but a slight trace of it.

The proper choice of iron is difficult, since many kinds of iron, owing to the presence of other substances therein, are not fit for tempering. For example, the presence of a proportion of manganese will entirely prevent decarburation, hence what is known as spiegeleisen cannot be employed because of the manganese in it. The presence of much crystalline graphite (gray iron) is just as injurious in another direction, for either it will not burn at all or it causes hollow spaces and cavities within the casting. The best iron is one free from manganese and containing amorphous carbon as white cast iron. In this respect, however, views differ, and the manufacture of malleable castings depends chiefly on practical experience.

This tempered or softened iron, if the material was well selected, makes a valuable iron which is but slightly inferior in strength to wrought iron. It can easily be worked with files and chisels, can be readily polished, and at a dull red heat can be wrought and welded. At the Halle exposition held in 1881 there was, says a paper published there, an interesting collection of articles made from this material, which shows that it is capable of a great variety of uses.

It is stated that the surface of cast iron can be tempered by immersion in aqua regia diluted with water.

P. N.

Fireproof Paper and Ink.

According to a German paper a very promising success has been attained recently in the manufacture of fireproof paper and ink. In making the paper ninety-five parts of asbestos was used with five parts of wood fiber; these, by aid of glue water and borax, were made into a pulp, which yielded a fine, smooth paper which could be used for writing purposes. It had the unusual quality of sustaining the influence of a white heat without injury. Fireproof printing and writing inks were made by combining platinum chloride, oil of lavender, and lampblack and varnish. These ingredients produced a printing ink, and when a writing fluid was wanted, Chinese or India ink and gum arabic were added to the mixture. Ten parts of the dry platinum chloride, 25 parts of the oil of lavender, and 30 of varnish are reported by a local writer to yield a good printing ink of this valuable kind when mixed with a small quantity of lampblack and varnish. When the paper printed with the compound is ignited the platinum salt is reduced to a metallic state and becomes a coating of a brownish black color. A free flowing ink for writing on the fireproof paper with an ordinary metallic pen may be obtained, says the same authority, by using 5 parts of the dry chloride of platinum with 15 parts of oil of lavender, 15 parts of Chinese ink, and 1 part of gum arabic, adding thereto 64 parts of water. When the paper is ignited after being written upon with this ink, the platinum ingredient causes the writing to appear transparent, and, as a consequence, it is claimed that such writing as has become black or illegible will become readily legible again during the process of heating the paper. Colors for painting may also be made fireproof by mixing commercial metallic colors with the chloride of platinum and painter's varnish, adding an ordinary aquarelle pigment to strengthen the "covering power" of the color. These fireproof paints or colors can be easily used in the same manner as the common water colors, and it is claimed they will resist the destructive influence of great heat quite as successfully as the fireproof printing and writing inks just referred to.

Wool Sorters' Disease.

Mr. Spear has recently published his official report, which establishes the identity of the wool-sorters' disease with anthrax. The symptomatology and anatomy of this affection are fully discussed, and certain interesting observations are advanced in regard to its pathology. The usual classification of anthrax into an "external" and "internal" form is observed throughout the report. In many instances, however, there is a wide divergence from the development and progress of typical cases. The malignant pustule may appear, not as an initial lesion, but as a local manifestation of constitutional infection, and a "minor pustule" is apt to attack the hands of those working on infectious material, a pustule very different from the typical form, but closely resembling the lesion resulting from only partially successful inoculation of anthrax virus upon carnivorous animals, and similar to that produced by Pasteur's "attenuated virus" in the herbivora. In the other variety of the disease, the anthrax fever, still more important deviations from the accepted type are described, and although the German and French observers look upon the affection as almost always fatal, Mr. Spear concludes that only a moderate number of cases terminate unfavorably. Again, while one man may be stricken down by a rapidly fatal malady, his comrade, working in the same material, may also be affected, but by a form of the disease which stops short of the severer symptoms, and ultimately goes on to recovery.

The histories of long-continued malaise, also, among wool-sorters are numerous. The symptoms are much like those of the prodromal stage of acute infection—headache, depression, nausea, dimness of sight, cramps, restless sleep, with the occasional appearance of cutaneous eruptions, petechiæ, boils, or herpes. At times an apparent periodicity is observed in the subjective symptoms. Such manifestations may occasionally occur as prodromata of an acute attack of the disease; more often, however, they disappear spontaneously. The author admits the possibility of a chronic anthracoid poisoning, the analogue of which may be found in malarial disease. The operation of the virus from its very inception is peculiarly inconstant. Incubation may be deferred by long periods of latency; full development may be delayed by prolonged and intermittent prodromata; often the disease aborts. At first, and for a variable time, the virus is "barely able to prolong its existence;" either the removal of unknown obstacles, however, or the addition to the blood, or secretions, of agents promoting the development of the poison, or both these contingencies, enables the infectious material to exert its full sway, and the disease to run its fatal course. To explain the unequal receptivity to the poison, Mr. Spear revives an old theory, that of the eating of more or less crude vegetables and fruit. Guided by the well-known predilection of this contagium for herbivorous animals, and by the fact that flesh-fed rats prove refractory to inoculation with anthrax virus, while the same rats fed on vegetables quickly succumb, the author was led to inquire into the alimentation of the wool sorters who had suffered from acute attacks of anthrax fever. He found that in nearly every case in which information was obtainable, the development of urgent symptoms had supervened upon the ingestion of an unusual quantity of vegetable food in some form or other. Again, in several cases of remission of the symptoms, a relapse seemed to follow the eating of vegetable food. In Constantinople also, where the external form of the disease is well known, the eating of vegetables and fruit during an attack is regarded as "especially dangerous." The evidence appears to be strong and circumstantial so far as such evidence can be. The experiments of Feser are now very generally accepted by Continental authorities as indicating that the relative immunity of the carnivora is not inherent to the genus, but is influenced by the nature of their food. The immunity of the fœtus is now regarded as dependent on the fact that it is really a carnivorous animal, not on any filtering action of the placenta. As Mr. Spear says: "It is conceivable that alimentary substances may bring about in the body such chemical or morphological changes as will render its fluids a richer field for the proliferation of disease germs."—*British Medical Journal.*

A Project to Pipe Gas Two Hundred and Fifty Miles.

A company of well known capitalists have organized the "Gas Light Transportation Company," to mine coal and manufacture gas in Pennsylvania, and pipe the gas to Eastern cities. A director of the company recently said that they propose to erect gas works that will manufacture 40,000,000 feet of gas per day. This would require 1,460,000 tons of coal annually. The coal can be bought at the mines for 55 cents per ton, but the gas companies pay $4.62 per

ton for it. They save something by the sale of coke, tar, and ammoniacal liquor, so that their coal costs them $3.14 per ton, or 32 cents a thousand cubic feet of gas manufactured. One great saving expected by the new company is in the cost of coal and in the transportation. Another saving will come, they think, from the freshness of the coal, since coal newly mined produces more and better gas than coal that has been exposed to the air and weather. The cost of pumping the gas is offset by the value of the coke. The deterioration of gas in the long pipe they expect to counterbalance by making the gas extra rich at first. The pipe is to be of iron, six feet in diameter, laid in hydraulic cement.

AGRICULTURAL INVENTIONS.

Mr. Sheldon B. Parker, of Groton, N. Y., has patented an improved potato digger, consisting of a carriage carrying a curved or angular bar provided with digging teeth and hinged at its ends adjustably to plates attached to the axle, the curved or angular bar provided with gathering teeth and hinged at its ends adjustably to the axle, and the two levers for regulating the pitch of the teeth, whereby the potatoes and the soil in which they are embedded are raised, and the potatoes are separated from the soil and collected along the center of the row.

An improved plow has been patented by Mr. Isaac V. Newsom, of Mount Meigs, Ala. The object of this invention is to facilitate the adjustment of plows and promote convenience in repairing them. The plow standard is made in two parts, or is slotted longitudinally, to receive the beam in its upper part and the plow fastening bolt in its lower part. The standard is hinged by a bolt, at or near its middle, to a metal block bolted to the lower side of the beam so that this standard can be adjusted to regulate the pitch of the plow.

An improved sulky plow has been patented by Mr. George Applegate, of Yoncalla, Oregon. The object of the invention is to provide means whereby the depth and width of the furrow cut by the plow may be easily regulated and the plow controlled while in motion, and to provide a plow of light construction and draught, and one which can be easily turned at the corners, and capable of such manipulation as to adapt it for plowing in indirect lines or curves.

An improved flax puller has been patented by Mr. Samuel W. Gaines, of Scio, Oregon. In using the machine, as it is moved forward the flax is clamped between reel bars and a padded drum, and is pulled by the reel and drum and deposited upon a platform whence it can be raked off by hand, or by an automatic mechanism connected with and driven from the driving parts of the machine.

The Geology of the Lake Region of New York.

At a recent meeting of the New York Academy of Sciences, Dr. Lawrence Johnson read an interesting paper on the "Parallel Drift-hills of Western New York." A glance at the topography of the western section of the State shows a series of long and narrow lakes, among which may be mentioned Skaneateles, Cayuga, and Seneca as perhaps the most important. These bodies of water vary from a few to one hundred miles in length, and are of extreme depth, considering their breadth, which is often not more than four or five miles, and at points even less. They lie in cup-shaped valleys between series of hills whose general direction is from north to south. They are connected by a stream of water called at different points Duck River, the Clyde, and so on, which finally turns the flank of the great limestone formation of the Niagara and empties into Lake Ontario. After minutely describing the surface of the section and noticing the extreme comparative depth of the lakes, varying from 400 to 600 feet, Dr. Johnson proceeded to consider the question of their formation, rejecting, for many reasons, the theory that they were excavated by icebergs. The section, embracing from 800 to 1,000 square miles, was one of great interest, the speaker said, because no such ranges of drift-hills had been elsewhere noticed on this continent, save possibly by Sir William Logan, who described a somewhat similar formation high up on the Ottawa River in Canada, whose ranges lay north and south in the same manner. Dr. Johnson advanced the hypothesis that the whole section he had described was once nearly covered with water, and there were evidences, as, for example, in the marshes north of Cayuga Lake, that they had formerly extended further northward. The tamarack tree grew in great abundance in these marshes on the north, and the nature of the strata beneath was such as to show that they were formerly parts of the bodies of water that they joined. It would be noticed by the listener that the long axes of the small lakes he had described, while pointing in the same general direction, all converged at such angles that they would meet, if continued on the map, in the great peninsula of Labrador, which was now believed to have been the mother of a vast prehistoric series of glaciers concerned in the formation and modification of the tract lying to the south and southwest. Lake Ontario was evidently formed by the same tremendous glacier that excavated the basin of Lake Erie.

Ceramoid.

Dr. R. Martin, of Sonneberg, in Thuringia, has invented a substance which is said to resemble matt porcelain biscuit and faience, and has the ring of ceramic products. The process employed by him consists in mixing the clay with water glass so that it hardens without the necessity of burning. The objects made of it, especially doll heads, key escutcheons, vases, etc., are made of clay, mixed with infusorial earth, cellulose, or fibrous substance, and either pressed in plaster moulds or made by pouring the thick paste into moulds, and then, after they are taken out of the mould, they are dipped in a solution of water glass. Owing to the capillarity of the substance mixed with the clay the water glass solution is rapidly absorbed by the substance and soon penetrates the entire mass, and when it hardens the mass resembles stone.

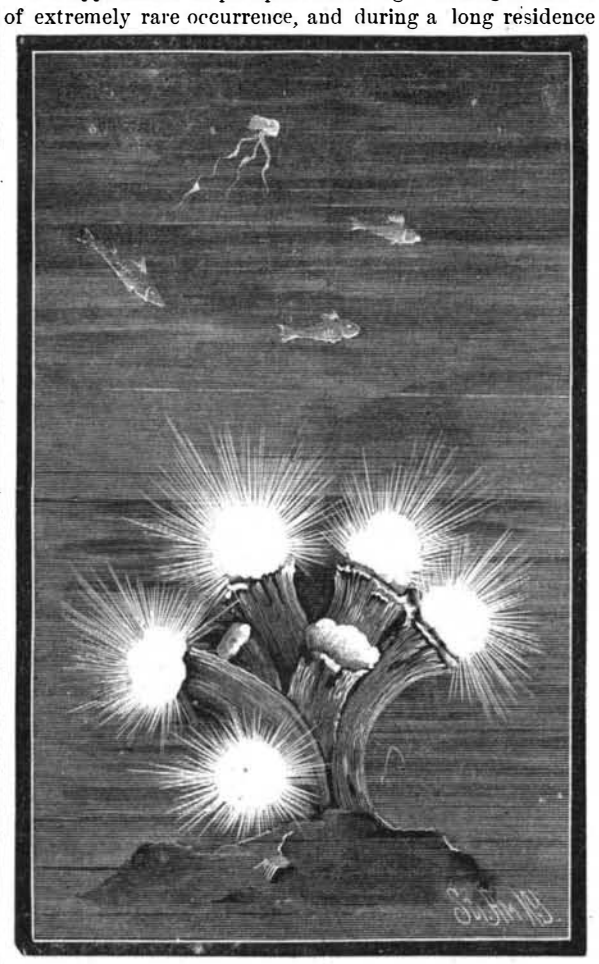
To color the article at the same time the paste is colored and poured or pressed into the form, and then the ground mass poured in as in making terra-cotta, where the finer parts are first filled up with prepared clay, which can be colored at will, and then filled out with ordinary clay that has not been elutriated.

It is well known that silicate of alumina, and also clay, when mixed with water glass solution, hardens and does not readily get soft in water. The strength and durability and power of resisting water is not, of course, equal to that which can be attained by burning. W. I. G. Z.

A PHOSPHORESCENT CORAL AND OTHER MARINE PHOS-ANIMALS.

BY C. F. HOLDER.

The appearance of phosphorescent light among corals is of extremely rare occurrence, and during a long residence



in the coral country, and of continued observation, the phenomenon was only observed once, and that in the genus *Caryophilla*. The specimen was first seen from the boat in about thirty feet of water, and brought up by diving, by the writer, and immediately placed in a jar of water, and finally transferred to an aquarium that had been built so that the tide rose and fell in it. Here the beautiful specimen was lodged, so that every movement of the animal could be observed. It had five branches, each one forming a cell showing beautiful radiating plates, striated externally, and collected into a solid conical polyparium fixed at the base.

The appearance of the animal when extended, though extremely attractive, did not come up to the one described by Professor Johnson, of London. "When taken," he says, referring to one dredged in deep water by Professor Travers, "the animal was scarcely visible, being contracted; when expanded, the disk was conspicuously marked by two dentated circles of bright apple green, the one marginal and outside the tentacula, the other at some distance from the transverse and linear mouth."

In the specimen kept by the writer the green was only faintly observed; and when the animal was within its cell the color of the mass was more inclined to yellowish brown, while two of the branches were denuded of animal matter, and were pure white.

The situation of the coral was about a foot under the surface, and a platform had been arranged so that the observer could watch it from the water's edge, and while so doing the light was first seen. At first we thought it might have been the phosphorescent flash of some minute acaleph, myriads of which were floating about, but to remove all doubt a glass funnel, slightly tinted, was gently lowered down over it, and a second later a slight flash illuminated it, and then another, showing a faint light that made small objects visible in the immediate vicinity of the polyp; and at one time a pteropod was suddenly thrown into a brilliant light when within a few inches of it. The flashes seemed to be intermittent, and to pervade the entire face of the cell in much the same fashion as does the light of the firefly the surface of that insect. By lowering a black glass near it an idea was obtained of the size of the reflection which was on the glass, an oval illuminated spot seemingly about the size of a silver quarter, and the color of the spark yellow, with perhaps a bluish tint.

In the accompanying illustration we have attempted to merely show the size and appearance of the illumination as it appeared twelve inches under water. The cause of this curious phenomenon is probably the same here, in a general sense, as in other forms. Perhaps there are special organs, as has been suspected in some of the acelphs, or it may be due to some fatty degeneration of the parts. In the sea pens (*Pennatulidæ*) the same phenomenon has been noticed, and a recent Arctic exploration discovered one of these curious creatures growing about four feet in height in water nearly a mile deep. The one known to science as *Renilla reniformis* is a rich purple species found off the coast of South Carolina. According to Agassiz it is remarkably phosphorescent, showing a golden-green light of wonderful softness. Another—the *Pennatula phosphorea*—is found in European waters of a rich red-purple color. Dr. Grant, in speaking of them, says: "A more singular and beautiful spectacle could hardly be conceived than that of a deep purple (*P. phosphorea*), with all its delicate transparent polypi expanded and emitting their usual brilliant phosphorescent light, sailing through the still and dark abyss, by the regular and synchronous pulsations of the minute fringed arms of the whole polypi."

Linnæus says that "the phosphorescent sea pens which cover the bottom of the ocean cast so strong a light that it is easy to count the fishes and worms of various kinds that sport among them."

One observer has been fortunate in discovering evidence of phosphorescent light in the boring mollusk pholas, having seen a faint flame or light playing about the entrance to its retreat; but the most wonderful of all the light-givers of the ocean are certain forms of ascidians. A compound one, the *Pyrosoma*, has been found, in the shape of a barrel, nearly five feet in length—an aggregation of many thousands of individuals. Huxley says of this interesting form: "The ascidiarium of *Pyrosoma* has the form of a hollow cylinder, rounded and closed at one end, truncated and open at the other, formed of a firm and transparent texture, in which the zooids are arranged in whorls; their oval apertures open on the exterior surface, and their atrial apertures into the interior of the cylinder. The hæmal aspect of each zooid is turned toward the closed end of the cylinder. The branchial sac has the ordinary structure, and each zooid is provided with a testis and with an ovisac containing a single ovum." To move along each zooid draws in water through its oval aperture and discharges it into the interior of the cylinder. The effect of so many currents being forced out of the open end propels the whole mass ahead in the direction it happens to take. Each of these zooids sometimes shines with a brilliant flame, so that at a distance through the water they have the appearance of great fire balls moving to and fro. The naturalist Bennet thus speaks of them: "I threw the towing net over the stern of the ship, which soon cleaved through the brilliant mass, the disturbance causing strong flashes of light to be emitted. On taking the towing net in it was found to be half filled with *Pyrosoma atlanticum*, which shone with a beautiful pale greenish light. After the mass had been passed through by the ship the light was still seen astern. The second occasion of my meeting these creatures," he says, "was in high latitude and during the winter season. It was on the 19th of August, the weather dark and gloomy, with light breezes from north-north-east, in lat. 40° 30′ S. and 138° 3′ E. long., at the west entrance of Bass's Straits, and about eight o'clock, when the ship's wake was perceived to be luminous, while scintillations of the same light were abundant all around. To ascertain the cause I threw the towing net overboard, and in twenty minutes succeeded in capturing several pyrosoma, which gave out their usual pale green light; and it was no doubt detached groups of these animals which were the occasion of the lights in question."

Humboldt also attests to the wonders of the colony of animals: "Only imagine," he says, "the superb spectacle we enjoyed when, in the evening from six to eleven o'clock, a continuous band of those living globes of fire was passing near our vessel. With the light which they diffused we could distinguish at a depth of fifteen feet the individuals of thymnus, pelamys, and sardon, which have followed us these several weeks, notwithstanding the celerity with which we sailed. Among these are other free swimming ascidians, as the salpa—animals that join in long bands, and from the masthead look like fiery serpents, winding their way through the sea. Myriads of jelly fishes add to the wonders of this submarine festival, and oval forms of red, blue, yellow, and green tints are seen rising and falling—veritable constellations of the sea; while the waves, charged with disconnected masses, break and roll away, lighting up the darkness with a ghastly glare that is reflected by the masts, sails, and rigging, that cast strange shadows over the deck and sea. The office of this strange light is mere speculation, as some fishes show the same, and many forms from great depths of the ocean. It has been surmised that its purpose is to provide light for those regions never to be explored and of utter darkness.

THE boiler of the Missjou Soap and Candle Works, on Sixteenth street, between Folsom and Harrison streets, San Francisco, Cal., blew up about 4 o'clock A.M., December 7. No one was injured. The building, which was worth $3,000, was demolished. The machinery, valued at $50,000, was more or less damaged.