degree of temperature it may have been heated, and it will not crack. Mr. Hutton employed the Moissan furnace for his researches, but incorporated some special features of his own design. The furnace was composed of a lower grooved block of magnesia with arrangements for the arc carbons, placed at right angles to the groove in the lower block, and an upper block plate. The graphitic carbon support—graphitic carbon was employed, as this material is absolutely pure, so that the fused silica cannot become impregnated with ashes—fitted into the groove. The quartz to be fused was granulated and placed upon the carbon support. A current of 300 amperes and 50 volts was brought to play upon the quartz, and in a few seconds it was melted. The support was then pushed further in, so that a fresh quantity of the powdered silica was brought under the influence of the arc. By this means Mr. Hutton has been successful in making rods and tubes one foot long from powdered quartz. In the manufacture of thick tubes of quartz Mr. Hutton employed a quartz mould with a carbon core about one-eighth inch in diameter with carbons to support it at either end. In the course of these experiments Mr. Hutton observed that the silica in the immediate neighborhood of the arc was inclined to change to silicon, but the black stain disappeared immediately the portion was removed from the center of the arc. The silica does not adhere to the carbon, as might be supposed, as it is powdered, so it can be easily separated from the core and the carbon support. Mr. Hutton, however, has not yet succeeded in obtaining a tube quite immune from bubbles, but he found that after the tubes had been made, if they were once more heated in the arc, they were considerably improved.

A NEW REVISED DESIGN PATENT LAW.

Congress has recently revised and amended the law concerning Design Patents, which act was approved May 9, 1902, and section 4,929 of the Revised Statutes was amended. The statute before and after amendment is shown in parallel columns for purposes of comparison:

Statute. R. S. Sec. 4,929.	Statute. Sec. 4,929 as amended by Act of May 9, 1902.
Any person who by his own industry, genius, efforts and expense, has invented and produced any new and original design for a manufacture, bust, statue, alto-relievo, or bas relief; any new and original design for the printing of woolen, silk, cotton, or other fabrics; any new and original impression, ornament, pattern, print, or picture to be printed, painted, cast or otherwise placed on or worked into any article of manufacture; or any new, useful and original shape or configuration of any article of manufacture,	Any person who has invented any new, original and ornamental design for an article of manufacture
the same not having been known or used by others before his invention or production thereof, or patented or described in any printed publication,	not known or used by others in this country before his invention thereof and not patented or described in any printed publication in this or any foreign country before his invention thereof or more than two years prior to his application, and not in public use or on sale in this country for more than two years prior to his application, unless the same is proved to have been abandoned,
may, upon payment of the fee prescribed, and other due proceedings had, the same as in cases of inventions or discoveries, obtain a patent therefor.	may, upon payment of the fees required by law and other due proceedings had, the same as in cases of inventions or discoveries, covered by sec. 4,886, obtain a patent therefor.

The changes made by the amendment are the following:

1. The word "useful" is omitted, and the word "ornamental" substituted in place thereof, as qualifying the designs.

2. The term "an article of manufacture" is made to replace the specification of particular matters in the prior statute.

3. The statutory bars to the issuance of a patent which were construed into the prior statute by virtue of the provisions of section 4,933 R. S., are included in in terms in the amended statute.

As to the substitution of the word *ornamental* for the word "useful," it is to be noticed that the form of section 4,929, as it appeared before amendment, in the Revised Statutes, was substantially the same as in the first design patent act of 1842, excepting that the law of 1870 removed the word "useful" from its place before the word "pattern" to the clause next succeeding, where it was inserted as qualifying shape or configuration. From the time of the first passage of this law in 1842 down to 1869, it was said by Commissioner Foote in *ex parte* Jason Crane:

"The construction which has been given to that act by the office ever since its passage in 1842 is that it relates to designs for ornament merely, something of an artistic character, as contradistinguished to those of convenience or utility."

And the Supreme Court of the United States said in the case of the Gorham Company v. White, decided in December, 1871:

"The acts of Congress which authorize the grant of patents for designs were plainly intended to give encouragement to the decorative arts. They contemplate not so much utility as appearance."

Commissioner Foote, however, held in the Crane case that a useful design might receive protection under the statute, and in this he was followed by Commissioner Fisher in *ex parte* Bartholomew, decided in December, 1869.

This practice was reversed in 1871, by Commissioner Leggett in *ex parte* Parkinson, who said:

"The law has provided for granting patents to the inventors or discoverers of new and useful arts, machines, manufactures, and compositions of matter, and also of any improvements thereof. The law authorizing design patents was intended to provide for an entirely different class of inventions, inventions in the field of æsthetics, taste, beauty, ornament.

"The question an examiner asks himself while investigating a device for a design patent is not 'What will it do?' but 'How does it look?' 'What new effect does it produce upon the eye?' The term 'useful' in relation to designs means adaptation to producing pleasant emotions."

It is thus apparent that there has been diversity of opinion as to the meaning of this design patent statute among the different Commissioners, and the statute has received different interpretations at different times.

In the case of Smith v. Whitman Saddle Company, 148 U. S., 674, the Supreme Court said, speaking of this statute:

"To entitle a party to the benefit of the act, in either case (mechanical inventions or designs), there must be originality, and the exercise of the inventive faculty; in the one there must be novelty and utility; in the other originality and beauty. Mere mechanical skill is insufficient. There must be something akin to genius, an effort of the brain as well as the hand. The adaptation of the old devices or forms to new purposes, however convenient, useful, or beautiful they may be in their new rôle, is not invention."

It is to be observed that in this opinion the "utility" of the mechanical patent statute is placed in opposition to the "beauty" of the design patent statute, although the word "useful" was in each of these statutes.

In 1899 the Circuit Court of Appeals of the Sixth Circuit, in the case of Westinghouse Electric Company v. Triumph Electric Company, spoke in regard to this matter, saying:

"We should think it very doubtful whether the word 'useful,' introduced by revision of the patent laws into the statute, is to have the same meaning as it has in the section providing for patents for useful inventions. The whole purpose of Congress, as pointed out by Mr. Justice Strong, speaking for the Supreme Court, in the case of Gorham Co. v. White (14 Wall., 511), was to give encouragement to the decorative arts. It contemplated not so much utility as appearance. We must infer that the term 'useful' was inserted merely out of abundant caution to indicate that things which were vicious and had a tendency to corrupt and in this sense were not useful, were not to be covered by the statute."

Referring to the case of Smith v. Whitman Saddle Company, the Court of Appeals of the District of Columbia said, in *ex parte* Tournier, 94 O. G., 2,126, February, 1901:

"We do not, however, understand the court as intending to go further than this and to hold that functional utility is to be regarded as a controlling or even an essential element in a patent for a design. For if so, the design patents would virtually be placed upon the same footing and with the same requirements of patents for mechanical inventions."

Following this same view of the force to be given to the word "useful" in this statute, the Circuit Court of Appeals of the Second Circuit, in the case of Rowe v. Blodgett & Clapp Company, 112 Fed. Rep., 61, adopted the language of the Circuit Court and referred to this subject as follows:

"I decide this case upon the broader ground that patents for designs are intended to apply to matters of ornament, in which the utility depends upon the pleasing effect imparted to the eye and not upon any new function. Design patents refer to appearance, not utility. Their object is to encourage works of art and decoration which appeal to the eye, to the æsthetic emotions, to the beautiful."

And in this case the court criticized the attitude of the Patent Office, saying:

"The practice of the Patent Office in issuing design patents seems not to have been uniform. Prior to 1871 it was not only liberal but lax, until in a carefully considered opinion Commissoner Leggett (*ex parte* Parkinson) conformed it to a construction of the law which subsequently found approval in the cases above cited."

This opinion concludes:

"But the designs of articles of manufacture not otherwise entitled to receive design patents cannot justify the issuance of such patents on any theory that the design is a trademark."

In view of these decisions, section 4,929 was difficult to understand in respect to the question of utility, and it resulted from this that many applications for design patents were filed for unpatentable subject-matter, to the disparagement of the whole patent system.

Immediately following the publication of the decision of the Circuit Court of Appeals in Rowe v. Blodgett, present Commissioner of Patents Allen squared the practice of the Patent Office with it and drafted the new section of the statute above quoted, which was introduced in Congress as Senate Bill 4,647. The Commissioner also submitted a written argument in its favor, which was embodied in the favorable report of the Patent Committee of the Senate. The new law is the first to set up a clear distinction between patents for articles having a shape or form relating to mechanical function only and things whose shape is ornamental and intended to produce pleasing emotions, without reference to functional utility.

In Commissioner Allen's argument before the Senate Committee on patents he said:

"It is thought that if the present bill shall become a law the subject of design patents will occupy its proper philosophical position in the field of intellectual production, having upon the one side of it the statute providing protection to mechanical constructions possessing utility of mechanical function, and upon the other side the copyright law, whereby objects of art are protected, reserving to itself the position of protecting objects of new and artistic quality pertaining however, to commerce, but not justifying their existence upon functional utility. If the design patent does not occupy this position there is no other well-defined position for it to take. It has been treated of late years as an annex to the statute coverng mechanical cases, since the introduction of the word 'useful' into it. It is thought that this practice should no longer continue."

In view of these decisions of the courts, construing the meaning of the word "useful" in the prior statute, the amendment which strikes out the word "useful" and substituting "ornamental" in its place, clears up the proper construction of the statute and expresses what was already included by construction of the prior statute, making the statute itself a guide to practice.

THE BRITISH SUBMARINES.

BY ERNEST ASHLEY.

During the last few weeks Submarine No. 1, one of five submarines now being constructed by Messrs. Vickers, Sons & Maxim for the British Admiralty, at a cost of £34,000 each, has been submitted to exhaustive trials at Barrow. The vessel was taken off Molney Island, where she maintained a speed of eight knots an hour, and when traveling with her turret awash the speed is considerably over that. Afterward she was submerged to the depth of 15 feet and for six miles the submarine ran under these conditions. The submarine was accompanied by the Furness Railway's twin-screw tugboat "Furness," with divers on board in case of emergency. The trials were conducted by Capt. Baron, R. N., D. S. O., and Capt. Cable, the celebrated submarine expert, who represents the inventors. The engineer officers and men attached to H. M. S. "Hazard" have been instructed in the construction and mechanism of the submarine by Capt. Cable and Mr. Monell. The boat is of the improved Holland type, the patent rights of which throughout the world—except in the United States of America—have been purchased by Messrs. Vickers. The boat has a length of 63 feet 4 inches, with a diameter of 11 feet 9 inches and a displacement of 120 tons when totally submerged. The hulls are divided internally into water-tight compartments by steel bulkheads. A 160 horse-power four-cylinder Otto gasoline engine is used for surface work. A 70 horse-power dynamo is run by her gas engine to store electricity when the boat is on the surface, and when going under, the gas engine is thrown out of gear and the dynamo is used as an electric motor, taking current from the cells it has stored. Should a torpedo be discharged from beneath the surface, trimming and ballast tanks, working automatically, compensate for the lessened displacement and maintain the ship in horizontal position. The submarine is capable of traveling 400 miles without exhausting the fuel supply, and to remain under water 48 hours at a stretch. Selected crews are to be trained this summer for the working of the new craft. Capt. Cable has now left for America.

SCIENCE NOTES.

In the museum at the University of Arizona at Tucson, a skeleton of a very large whale found in the desert south of Yuma has been mounted. Other finds of rare value have been made in this same region. In the University museum are the tusks and lower jaw of an elephant found in the Yuma desert.

The journey of a bottle from central Illinois to the Pacific Ocean has just come to light through the receipt of a letter by Walter Roeder, of Bloomington, Ill., from Jesse Wilson, of Santa Monica, Cal., saying that he had found a bottle off the coast of California which contained a letter written by Roeder and asking the finder to inform him when and where it was found. The letter was written on January 27, 1900, and after being placed in the bottle the receptacle was cast into the water of the Mackinaw River, ten miles west of Bloomington. The bottle must have followed the river until the confluence with the Illinois was reached and thence floated to the Mississippi and through the Gulf of Mexico to the Atlantic Ocean. The currents of the ocean are supposed to have carried the bottle around Cape Horn and thence up the Pacific coast. The journey exceeded 10,000 miles. The bottle and message betrayed little evidence of the long journey.