

clamp fastenings. These sections are built up, one upon another, until the mould—placed vertically in the pit—reaches to the surface. This is lined with a thick layer of cement and sand to resist the heat of the melted iron.

The casting is done after the Rodman system—that of cooling from the interior. To illustrate the effect of this, the mass of iron we will suppose to be divided into concentric rings, the inner one of which cools first and contracts, when the second cools, shrinking upon and firmly uniting with the first.

In the guns cast after the old method of cooling from the exterior there was always a quantity of idle metal, so to speak, but by this plan each ring or circle does its part in withstanding the pressure, and the internal strains are so distributed that no part of the iron is subjected to strains in a direction abnormal to those which it assumed when cooling.

This cooling from the interior is effected by a hollow core, consisting of a wrought iron tube, about 9 inches in diameter, covered externally with clay to resist contact with the molten iron, and made perfectly tight at the bottom, but open at the top.

On July 9 an attempt was made to cast one of these enormous guns. The mould had been made ready, and the furnaces had been going since the day previous. Each of the three furnaces, which are located at a little distance from the pit, as shown in the cut, contained 40 tons of iron.

Our second engraving shows a gun being moved to the machine shop. The casting is remarkably perfect, no flaws or other imperfections being visible, and even the joints formed by the various sections of the mould being hard to discern.

Novel Form of Earth Plates.

A novel form of earth plate, in which a continuous process of depolarization goes on, has been devised by Mr. Justin Halisz, chief electrician to the Galician railways. In a square hole in the ground, about two meters deep and one meter square, there is placed a bed of coke of moderate thickness.

The Belgian Government has officially invited all foreign governments to take part in the Universal Exhibition, which will be opened in Antwerp the 2d of May, 1885.

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REMOVAL.

The SCIENTIFIC AMERICAN Office is now located at 361 Broadway, cor. Franklin St.

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(Illustrated articles are marked with an asterisk.)

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THE SCIENTIFIC AMERICAN SUPPLEMENT

No. 447,

For the Week ending July 26, 1884.

Price 10 cents. For sale by all newsdealers.

Table listing contents of the supplement including CHEMISTRY, ENGINEERING AND MECHANICS, TECHNOLOGY, PHYSICS, ELECTRICITY, ETC., ARCHITECTURE, ART, ETC., ASTRONOMY, GEOLOGY, NATURAL HISTORY, BOTANY, ETC., PHYSIOLOGY, HYGIENE, ETC., and BIOGRAPHY.

CONGRESS AND THE PATENT OFFICE.

Congress has made a slight increase in the appropriation for the Patent Office for the year ending June 30, 1885. The Commissioner asked for \$650,000 on account of salaries for those employed in the department, but was allowed only \$597,170; this, with the various changes made, will give an actual increase of 52 in the number of employes.

The business of the Patent Office has been notoriously in arrears for more than a year past. According to a report made by the Commissioner in April, there were at that time over 5,000 cases pending in the different divisions of the office. A large proportion of these were cases which had not yet received the first inspection of an Examiner, applicants having to "wait their turn" in a manner but little less tedious than if they were litigants before the Supreme Court.

Of the many bills introduced for the nullification of patents not one of which was passed, it should be particularly remembered that they did not die with the session. The snake is not killed, but was only scotched, by the indignant remonstrances which the proposed legislation elicited.

DRIVING BY FRICTION.

For many purposes for which gear wheels were formerly used surface friction wheels are now employed. If the surfaces are properly matched as to material, and are sufficiently large as to area, there appears to be no reason why friction wheels cannot be more extensively employed than they have been heretofore.

An objectionable method of employing the friction driving is to use a metallic surface against a wooden or a leather surface; two surfaces of wood are better; but if iron and leather or iron and wood are used together, the driver should, in all cases, be made of the softer material.

Excellent wheels are made of maple—hard rock maple—and of lignum vitæ, the lignum vitæ wheel to be the driven and the maple the driver. The wheels should be a cast iron spider made to receive the wood, which should be sawed into wedge-shaped or radial segments, so that the end grain of the wood bears and makes the contact surfaces.

One of the advantages of friction wheels over cogged wheels is that when they are started there is no shock, but only a gradual coming up to speed. Another is their noise-

lessness; but the epicycloidal cutting of gear teeth latterly has made this objection untenable, as gears can be run as silently as belts. But a great advantage is the very slight movement necessary to connect and disconnect, the actual surfaces requiring to be merely and barely separated to insure a stoppage of motion.

VARIATIONS OF SPEED.

The contrivance of step cones with shifting belts is a cumbersome and troublesome one for procuring gradations of speed. In many cases it answers its purpose, but in others some more sensitive and intermediate device would be better. A change of speed is readily obtained by a change of position of a driven wheel on the face (side) of a driver wheel or disk. The face of this disk may be either straight or slightly dished, and the driven roll or small pulley traverses the face of the disk from the shaft to circumference. It is evident that while the driven wheel is nearest the shaft of the disk it will revolve the slowest; and also it is evident that as the driven wheel is run out toward the circumference of the disk it will revolve the faster.

The shaft of the driver—the disk—is, of course, at right angles to that of the driven pulley; these relative positions must be maintained. But it does not matter, in practice, whether the disk is on a horizontal or a vertical shaft, so long as the driven is so arranged as to be permitted to be placed in contact with the disk at any point from center to circumference.

This device, with some modifications, has already been employed in the machine driving of potters' wheels and in the foot driving of sewing machines. But it is capable of a wider adaptation, especially in the machine shop, where sudden changes or quick variations of speed are frequently necessary. The large disk may be of cast iron turned and finished, and the driven wheel of iron, leather faced, or of wood. The progress of the driven wheel from shaft to circumference of the disk—from low speed to high speed—could be controlled by lever, worked by hand or by foot treadle. It is a much closer and more sensitive device than the present system of absolute changes of speeds on our lathes and drilling machines.

THE GREELY EXPEDITION.

It was August 18, 1881, that the officers and crew of the Proteus bade good-by to Lieutenant Greely and his little band, twenty-five in all, leaving them in camp, as an advance guard of explorers, in a high northern latitude. The exploration in which they were engaged was not one for the advancement of material aims or the ambition of governments to enlarge their dominions—it was one solely in the interest of science, to widen the domain of knowledge, and help us to better know the laws which affect the conditions of life and growth on this planet, as well as to throw light, if possible, on that great field of research, so largely speculative, in which we are seeking to find out something of the universe. It was not until the 22d of June, 1884, a little more than two years and ten months after the party had been left on the shores of Lady Franklin Bay, that seven of them, the only living members of the original band, were relieved of their long vigil by the appearance of the vessels of the government expedition under Commander Schley. Seventeen of the others had died of starvation, one was drowned while sealing to obtain food, and of those found alive one died subsequently from the amputation of limbs made necessary by frost bite, so that only six of the original twenty five remained alive to reach home again.

The story of the expedition, the plans of the scientific bodies and Arctic explorers which led up to it—in connection with several other observation posts around the pole—as well as the futile efforts of 1882 and 1883 to reach and relieve the colony at Lady Franklin Bay, have often been told. It was the understanding when the station was established—subject to the discretion of Lieutenant Greely, as circumstances might affect the situation—that if government relief did not reach the station during the summer of 1882, the party would endeavor to work its way southward in the summer of 1883 as far as Cape Sabine, or make its quarters on the west coast as far south as might be practicable, and yet within the possibility of being reached by a relief expedition, but that the route would be on or along the west coast, and not on the Greenland side. In accordance with this idea Lieutenant Greely abandoned his quarters at Fort Conger, on Lady Franklin Bay, August 9, 1883, and reached Baird Inlet, near Cape Sabine, September 29, with the entire party well up to that time. Great difficulty was experienced in getting to that point, with the instruments and records of observations, and as large a supply of provisions as it was possible to convey. He was obliged to abandon all his boats, and was adrift for thirty days on the ice in Smith's Sound, the party finally making its way across an almost impassable field of ice hummocks to a landing just north of Cape Sabine, where a permanent camp was established October 21.

Here the party found that a very insufficient supply of provisions had been left, while some of those thus obtained had been left by Sir George Nares as long back as 1875, and were of course much damaged. It was known that supplies had had been left on Littleton's Island, almost opposite Cape Sabine, on the east side of Smith's Sound, but the channel did not close all winter on account of violent gales and the strong currents, and there was no means of reaching the food that was so near. The party was immediately put on short rations, but on May 14, 1884, the last regular food was is-

sued. After this the men were forced to live on boiled sealskin strips from their sealskin clothing, lichens, and shrimps, game having failed despite daily hunting from early in February.

One had died in January, 1884—the first death of the party—then five died in April, four in May, and seven in June, up to the 22d, when the rescue was made, and when, according to Commander Schley, "forty-eight hours' delay in reaching them would have been fatal to all." Too high praise cannot be accorded to Commander Schley for the energy with which he pushed north so early in the season, fighting his way almost inch by inch through the ice; but it will be remembered with a feeling of sadness, if not of severe reprobation, that three United States vessels, the Yantic, the Proteus, and the Neptune, had visited the near locality of Greely's fatal camping ground, during the summers of 1882 and 1883, with ample provisions, and come home again without leaving there the supplies that would have prevented these men from starving.

It is too early to say what will be the probable value of the information obtained by this expedition. Up to the fall of 1883 its success seems to have been all that could have been desired by its promoters, and in the journey southward copies were brought of meteorological, tidal, astronomical, magnetic, pendulum, and other observations, although some photographs, Esquimau relics, and other things were necessarily left behind. It is probable, however, that Lieut. Greely made all the observations required by the International Conference at Hamburg, under whose directions the various circumpolar stations were established, and that substantially all such records have been saved. The distinguishing work of the expedition—that which will per-



haps give it most fame—is thus announced by Lieut. Greely: "For the first time in three centuries England yields the honor of the furthest north," which had previously been 83° 20', but was marked at 83° 24' by Lieut. Lockwood of the Greely expedition, on May 13, 1882. The point of observation was named Lockwood Island, where, "from an elevation of 2,000 feet, they saw no land north or northwest." To the east and northeast of Lady Franklin Bay the party undoubtedly made the best survey yet accomplished of northern Greenland, and, by observation of what seemed to be a distant headland, located it as Cape Robert Lincoln, in latitude 83° 35', longitude 38° west of Greenwich.

At B, in our map, is shown Lockwood Island, the highest northern latitude yet reached, and from whence the observation was made, while A marks the highest point attained by Commander Markham, the most successful British explorer, in 1876. In a subsequent endeavor to go still farther north, the party was turned back by open water, and, as Greely's report says, "barely escaped drifting into the Polar Ocean."

There are many other newly named places, and some material changes will have to be made in the maps of regions hitherto incorrectly laid out, along the west shore of Kane Basin and Kennedy Channel, and in the configuration of Grinnell Land, and the north shores of Grant Land and Greenland. Arctic geography will thus, doubtless, be greatly amended, but whether the results attained will prove sufficient compensation for the loss of life of the brave men who were sacrificed is a query which many people will think most unsatisfactorily answered.

GLASS MAKING IN ITALY.—Colle de Val d'Elsa contains one of the most important glass works in Italy. The value of the annual production amounts to 2,500,000 lire; its sale extends over all Italy, but more especially in the Roman, Tuscan, and Piedmontese provinces.

LABELS AND TRADEMARKS.

In the year 1874, the duty of registering labels, hitherto performed in the office of the Librarian of Congress, was transferred to the Commissioner of Patents. In accepting this office the Commissioner for some reason imagined it a part of his duty, when a label was presented for registration, to exercise judicial functions in deciding whether it was a label or trademark from a *prima facie* standpoint. The label after one or more examinations was pronounced eligible for one of the forms of protection, except in comparatively rare cases, when something obviously neither one nor the other would be entirely rejected. In the numbers of the *Official Gazette* prior to 1882 several decisions of the Commissioner on this subject will be found. In virtue of such decisions many labels were refused registration on account of their arbitrary and non-descriptive character, and were brought into the trademark class. The definition of a label that was the working standard of the office was taken from Webster's Dictionary. It reads as follows: "A narrow slip of silk, paper, parchment, etc., affixed to anything, denoting its contents, ownership, and the like; as the label of a bottle or a package." (O. G., August 10, 1881.) From this it was assumed that a label must be descriptive of something connected with its object, and everything in the shape of an arbitrary or non-descriptive symbol the Commissioner refused to register except as a trademark.

This practice prevailed until the year 1881, when two very important events took place. The first of these was the passage of the new trade mark act of March 3, 1881. This was to replace the old statute, which had been declared unconstitutional. By it the additional restriction was placed upon trademarks, that in order to be subjects of protection by the United States courts they must be used in commerce with foreign nations or some Indian tribe. In the old practice of the Patent Office almost anything that they decided to be unregistrable as a label could be registered as a trademark. But this new restriction threw out a great many *quondam* registrable trademarks, and in conjunction with the Patent Office rulings deprived many labels of any registration whatever.

This state of affairs quickly became oppressive, and the important decision of the Supreme Court of the District of Columbia in the case of the United States vs. the Willcox & Gibbs Sewing Machine Company came in good time to relieve it. This was the record of the important events alluded to above. The court held that the Commissioner had no right to exclude from copyright registration any label under the guise that it was a trademark. The Commissioner at once accepted this decision, and changed the practice of the office to correspond therewith.

All went satisfactorily under the new ruling, and the interests of private individuals and of commerce at large were equally guarded. The Supreme Court, although it did not base its decision on the intrinsic qualities of labels and trademarks, reached by other ways a thoroughly common sense and practical conclusion. The acquiescence of the Commissioner in the spirit of the decision was full and complete.

Less than a year ago a new Commissioner of Patents was appointed. At first he followed the revised practice of his predecessor, but recently, in the face of the decision of the Supreme Court, he has returned to the old practice, and exercising his powers of judgment attempts to discriminate between labels and trade marks. No court in this country is in better repute than the Supreme Court of the District of Columbia. It is the great court of appeal from the decisions of the Commissioner, and its decisions would seem to be particularly binding upon his actions. Yet his new rulings are directly in the face of and contrary to the decision of November 30, 1881, and he apparently wishes to have a decision from a higher tribunal before changing his views.

Leaving for the present the relations existing between the Commissioner and the Supreme Court of the District, we may glance at the hardship inflicted by this course upon applicants for registration of trademarks. On application a fee must first be paid, which fee is not returned. If the label is decided not to be registrable as such, the applicant, pocketing his loss, may apply for trademark registration, paying another and larger fee. Here too he may be ruled out, when he is left without any way of recovering his fees, and without any equivalent being awarded him for them.

Rulings that lead to this result are wrong. The Commissioner has no responsibility in the matter if he will follow the voice of the court, his direct superior. But of his own volition he has taken the responsibility of departing therefrom, and has chosen to inflict this petty hardship upon many who are ill able to afford it.

Car Couplers.

According to a statement made before the Master Car Builders' Association, there are now in use in this country 800,000 freight cars, and the average annual expense for links and pins for each car is \$1.50, or a total of \$1,200,000. It is evident that a self-acting car coupler, so made as to prevent the maiming, loss of life, and expense of the common link and pin system, would be an invention of enormous value. Many hundreds of patents have been taken for improved car couplers, but the railway companies, for one reason or another, are shy about introducing them. In Massachusetts a law has been passed compelling all railway companies in that State to put self-acting couplers on their cars on or before 1885. If other States would adopt compulsory laws on the subject, the introduction of improved couplers would soon become general.