THE "TEMPLE BLOCK," SALT LAKE CITY.

The Mormon Tabernacle at Salt Lake City, the central one of the three structures shown in our illustration, has had the reputation of being, ever since its erection, the largest assembly hall in America. It is capable of comfortably seating 8,000 people. It is 250 feet long, 150 feet wide, and 80 feet high. The building was completed October 6, 1867, having been a little more than two years and a half in process of erection. Its construction was superintended by Mr. Henry Grow, and the cost was paid by the voluntary contributions of the Mormon people. The roof is composed of a lattice truss, the thickness from the inside of the ceiling to the shingles being ten feet, and the trusses resting upon forty-four sandstone piers built in the most substantial manner. There are twenty double doors, nine feet wide, opening outward, with large windows above them running up under the eaves, serving the double purpose of lighting and ventilation, there being also two large windows in the roof. It is lighted by electricity. The large organ with which it is furnished was made in Salt Lake City, and nearly all of the work was done within the Tabernacle itself. Mr. Joseph Ridges superintended the construction and Messrs. Johnson & Taylor added many improvements. It has 57 stops and 2,648 pipes, the largest made of wood brought from Southern Utah, and its cost was over $100,000.

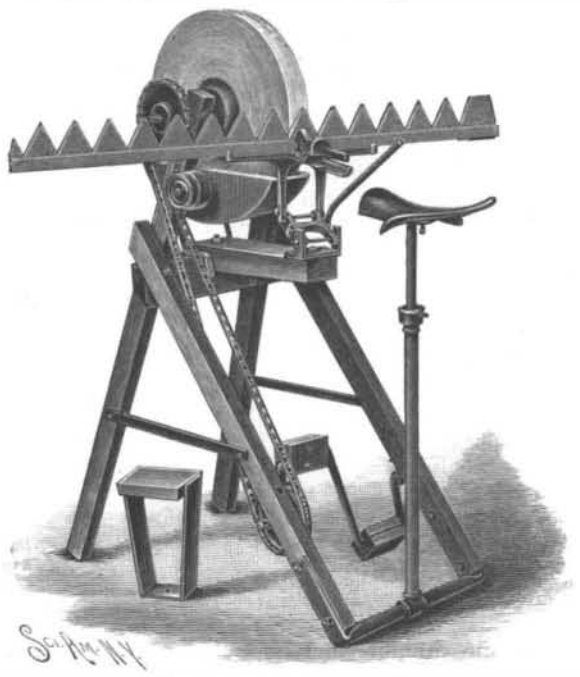
Twice a year, April 6 and October 6, the Tabernacle is filled to its utmost capacity. Perhaps the most remarkable thing about the building is its marvelous perfection as a sound chamber, a faint whisper being plainly heard 250 feet away, at which distance also can be distinctly heard the fall of a pin dropped only two inches upon a table. The latter fact was demonstrated only a few weeks since, in the presence of a representative of the SCIENTIFIC AMERICAN. Curiously enough, however, it appears that, although a speaker need never speak very loudly to be distinctly heard in all parts of the building, yet a serious obstacle to the hearing frequently arises from any noise made by the hearers—the moving of feet, or other slight cause, naturally producing as far-reaching effects as the voice.

The Temple, shown at the right of the picture in its present unfinished state, was commenced in 1853. Upon the arrival of the Mormons in Salt Lake Valley, in 1847, Brigham Young, looking toward Ensign Peak, marked the site with his cane, saying: "This is the place to stay; this is the spot I have seen in vision." When completed it will be one of the most durable and imposing edifices in America. The walls are ten feet thick at the surface of the ground. There are to be three towers at each end, the center ones being each 220 feet high. The building is 186 feet long by 99 feet wide. It is built of white granite, quarried at the mouth of the Little Cottonwood canon, twenty miles distant, and formerly hauled by ox teams, but now brought by rail direct to the Temple grounds. It has cost up to date nearly four millions of dollars. The Mormon temples are not designed for public worship, but for the administration of ordinances, rites and ceremonies, etc., and the assemblies of the orders of the priesthood.

The Assembly Hall, in the southeast corner of "Temple Block," is 68 by 120 feet in size, and has an auditorium designed to seat 2,000 persons. The cost of the building was nearly $250,000.

A MACHINE TO GRIND SICKLE BLADES, ETC.

A compact and simple machine to facilitate the grinding of sickle blades of harvesters or mowing machines while on the cutter bar, giving them a correct beveled cutting edge, and also adapted for sharpening



KNOBEL'S SICKLE GRINDER.

cutting tools of various kinds, is shown in the accompanying illustration. The improvement forms the subject of a patent issued to the Rev. A. Knobel, of Louisville, Ky. To a forwardly extending portion attached to a casting to which the four legs are bolted, is attached a sickle clamp, consisting of three pieces, one of which is bolted to the base piece, an intermediate part being attached to this piece by a hinge joint, and an upright clamping section being hinged to the intermediate part, whereby the knife may be kept in a horizontal position and at the same time moved perpendicularly to bring all parts of the edge to be ground against the stone. A lever inserted in holes in either side of the intermediate piece may be used to move the knife perpendicularly, but this lever may be dispensed with, and the knife moved by simply grasping a two-part handle, the lower part being movable, so that by closing the hand the knife is gripped. The clamping section has side arms or extensions, whereby the knife will be firmly seated when the end sections are being operated on, and the clamp, while holding the knife securely, allows it to be quickly and easily released and a new section clamped as the work progresses. The seat for the operator has a pipe support, in the upper end of which slides a piece of square iron, to which the saddle is attached by a set screw, so that it may be adjusted backward and forward, while the seat-holding rod is held in any position to which it may be raised by a key seated in the socket portion of the support. The tool rest or table is designed to facilitate the handling of the work, and the cranks and pedals are adapted to insure a steady motion in either direction.

The Manufacture of Mosaics.

One of the few industries of Rome is the manufacture of mosaics, the largest establishment being under the control of the Church, and employed almost entirely in the adornment of churches and religious establishments. The process of making a picture in mosaic is very slow and requires the highest order of skill. To begin with, mosaic is made of glass, and its value consists in its being indestructible.

The workmen in great pictures have to use something over 26,000 shades of colored glass to produce the tints requisite, as in a mosaic every color is necessary, just as in an oil painting. To make a picture, the process is this: A plate of metal of the required size is surrounded by a raised margin an inch in height. A mastic cement of powdered stone, lime and linseed oil is spread over the bottom of the plate, and that is covered up with plaster of Paris to the level of the rim. Upon this the picture to be made is very carefully drawn, and the mechanic's work begins.

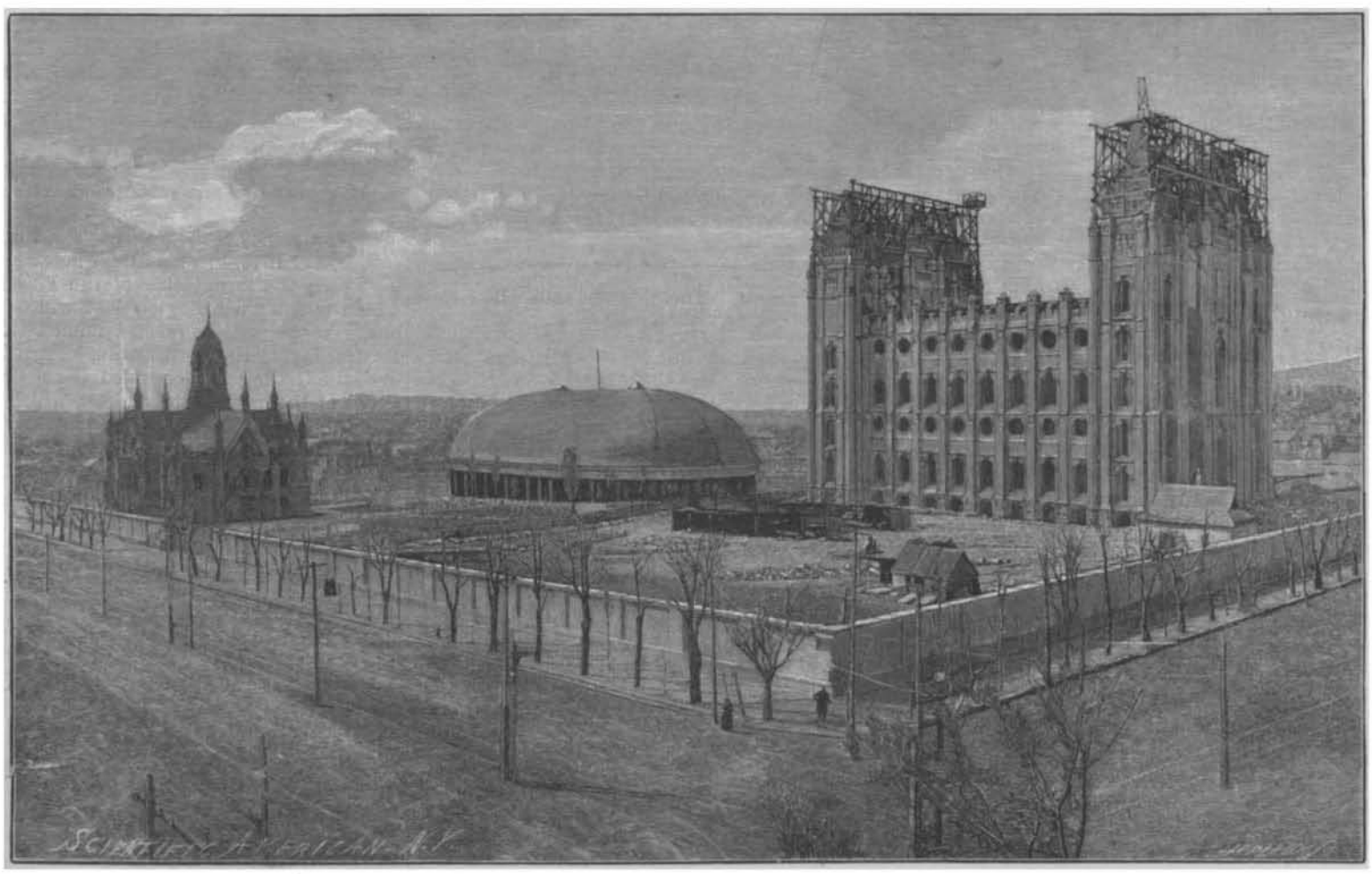
He takes a piece of glass of the exact tint necessary and fits it into its place, grinding to the shape. Then he goes on, one piece at a time, till the picture is finished; then the face is ground down to smoothness, and the picture is set in its place.

Some of the greatest pictures of ancient and modern times are in mosaic, the tints, with all the delicate shades, being carefully reproduced as in oil, and the effect being finer. The ceilings of many of the great churches of Rome are entirely of mosaic, as well as many of the altar pieces and other decorations. As they are entirely indestructible, and never lose their color, they are very much prized. A picture in mosaic costs a great deal, but then it is eternal, barring fire and earthquakes.

All over Rome there are small shops devoted to the manufacture of mosaic table tops, box covers, etc., the workman toiling all his life on one subject. The man who begins on St. Peter's or the Coliseum never does any other subject, and he becomes so skillful in this one that he is enabled to execute it not only well, but cheaply. He has only the tints to manage that enter into one picture, and he places them mechanically and very rapidly.

Cement for Metal.

This well known cement, which is prepared from zinc oxide and zinc chloride and some other material, such as iron slag, powdered glass, etc., may be caused to set more slowly by adding with the zinc chloride, when it is mixed with the other ingredients, some zinc sulphate and powdered limestone. The adhesive power of the cement (for cementing metals) may be increased by the addition of 2 per cent of ferrous sulphate.—*H. Spenle.*



THE FIVE MILLION DOLLAR MORMON TEMPLE AT SALT LAKE CITY.

Starboard and Port.

Since the 1st of July, of this year, the old words of command for altering the helm, viz., "starboard" or "port," have been given up on board the ships of the North German Lloyds and the Hamburg-American lines, and the order "right" or "left" substituted.

It is difficult to break with old customs, and seamen in especial are conservative; it is, therefore, not a matter of wonder that many old sailors look with great disfavor upon this latest innovation. On board the steamers of the two great lines mentioned above, however, the change has been made obligatory, and, according to a report forwarded to the directors by one of their oldest captains, who was himself opposed to the idea, has been attended with the happiest results.

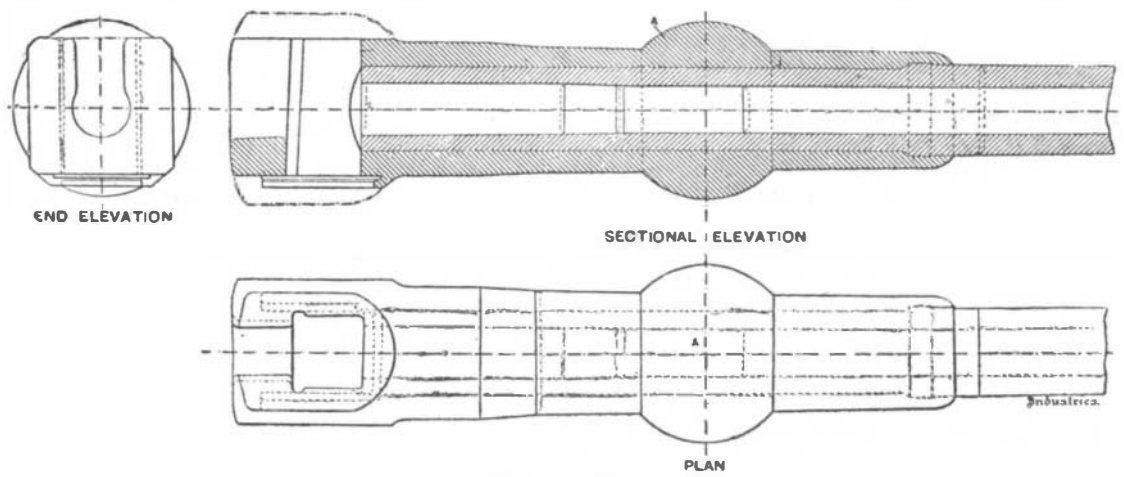
As soon as the order "right" is given, the telegraph is moved to the right, the wheel is revolved to the right, the ship turns to the right, the rudder indicator points right, the rudder itself moves right, and the steering mark on the compass as well; and so *vice versa* when the order "left" is given. Nothing can be simpler, and no possibility of mistake can arise.

The objection has been raised that the new words of command are not international, and are therefore illegal. This statement, however, will not hold good, as both English and American pilots, in whom every one has confidence, have made no difficulties in using the new words of command when piloting ships of the two before mentioned companies.—*Nautical Magazine.*

THE "ADAMSON" GUN.

The illustrations represent a sectional elevation, end view, and plan respectively of a gun invented by the late Mr. Daniel Adamson. The principal feature of this type of gun consists in abolishing the trunnions and substituting therefor a ball joint, A, or spherical enlargement, which works in a suitable socket on the gun carriage. The advantage claimed for this arrangement is that the gun—a model of which is now exhibited—can be readily trained to cover a much greater range without moving the carriage. The gun was made at Bofors, in Sweden, and, according to *Industries*, has been tested by Swedish artillerists with the following results:

The gun was fired five times in twenty seconds. An elevation of 25 degrees was found to carry the projectile 26,250 feet, or nearly five miles. Eighty-five rounds were fired. It is stated that the gun, with even more than sufficient strength, combines great durability with respect to its weight, and that the mechanism is simple and easy to manage, and does not require experts for its handling. The leading particulars of this gun are: Caliber, 3·36 inches, length, 98·43 inches; weight, 1,200 pounds; rifling, number of grooves, 24; depth of grooves, 0·039 inch; width, 0·295 inch; width of lands, 0·138 inch; twist muzzle, 33 caliber; weight of shell, 14·77 pounds; weight of charge (black powder), 5·51 pounds; volume of chamber in case, 161·72 cubic inches; volume of bore, 796·40; muzzle velocity, 1,920 feet with black powder, and 1,970 feet with smokeless powder.



THE "ADAMSON" GUN.

The Tocci Twins.

The *Southern Practitioner*, an influential monthly devoted to medicine and surgery, published at Nashville, Tenn., has produced in the January number the engraving of the Tocci twins, with the description, which appeared in this paper in issue of December 12, last year. In referring to this interesting specimen of tocology, the editor states the source from which his article is derived as follows:

"The description is taken from that standard and most reliable publication, which we regard as the best journal in America or the world, the SCIENTIFIC AMERICAN. Having had a personal and private interview with Mlle. Christine Millie in 1860; having seen and had a personal interview with Messrs. Chang and Eng, the great Siamese twins; and in a somewhat arduous work in medicine since 1854, it has been my opportunity to see more or less of monstrosities and abnormal formations, yet I do not hesitate to class the Tocci twins as something more than remarkable. It is to be hoped that if they ever marry they will have 'two souls with but a single thought, two hearts that beat as one.'"

Anti-Friction Bearings.

The metal of the well known patent Magnolia anti-friction bearings has been found by analysis to have the following composition:

Lead	80 lb.
Antimony	15 "
Tin	5 "
Bismuth	4 oz.
Graphite	8 "
Aluminum	4 "

Letters Patent for Inventions.

The origin of letters patent for inventions dates as far back as the Statute of Monopolies in the reign of James I., by which statute exclusive rights were given to the first and true inventor of a new manufacture for a term of fourteen years, provided it was not contrary to law or mischievous to the State. A patent for a useful invention is not under our law, nor, indeed, under the law of England nor any foreign country at the present day, the grant of a monopoly in the sense of the old common law. It is the grant by the government to the originator, discoverer, or inventor of a new and useful art, machine, manufacture, or composition of matter, or any new and useful improvement thereon, of the exclusive right, for a term of years, of practicing that invention. The consideration for which this grant is made by the Crown is the benefit to society resulting from the invention, which benefit is conferred upon the public by the inventor: first, by the immediate practice of the inventor under the patent; and, secondly, by the practice of the invention or the opportunity to practice it, which becomes public property on the expiration of the patent.

The history of patents in Canada begins in 1824, when the first patent was issued on the 8th of June to one Noah Cushing, of the city of Quebec, for a washing and fulling machine. From that date up to the year of the confederation of the Provinces, there were only 1,866 patents issued, and these comprised the patents issued by each of the provinces or colonies, which before that period had a separate patent act of its own.

Since confederation, however, a great increase has been made in the number of patents taken out in Canada, nearly 40,000 patents having been issued since then. Our valuable manufacturing, lumbering, and mining industries, fostered and protected by the national policy, have in a large measure stimulated the progress of invention in this country, and it may safely be said that the sons of this fair dominion have produced inventions the importance of which is in no degree inferior to those of our neighbors south of us. Such is the enterprise of Canadians that patents for important inventions are now being taken out by them not only in Canada, the United States, and England, but in the various colonies of the empire, and in many foreign countries.

Patents are granted in Canada for a term of fifteen years. The first government fee is $20, which fee protects the invention for five years, two further fees of $20 for each succeeding five years being requisite in order to protect the invention for the full term. It is, therefore, necessary to pay the first fee in order to obtain the patent, and the subsequent fees in order to keep it alive the full term. Two other requisites are necessary in order to keep the patent alive, namely, the article covered by the invention must be manufactured within two years from grant, and it must not be imported for more than a year. Specifications, drawings, and models are required to be sent to the Canadian Patent Office before a patent will be granted, and such is the importance of having inventions thoroughly covered, in order to protect the inventor from infringement, that special experts are employed by inventors, so that their applications may be prosecuted to a successful issue before the Patent Office. It is essential that men having a legal as well as a mechanical experience should be employed.

Many people are in the habit of not only thinking of, but speaking of, inventors as cranks. But when one considers the advantages reaped from the indomitable energy and perseverance of such so-called cranks, it must be confessed that to that class of the community we are more indebted than to any other.

Lord Bacon corroborates this statement in the following:

"The introduction of great inventions appears one of the most distinguished of human actions, and the ancients so considered it; for they assigned divine honors to the authors of inventions, but only heroic honors to those who displayed civil merit, such as the founders of cities and empires, legislators, the deliverers of their country from lasting misfortunes, the quellers of tyrants, and the like. And if any one rightly compare them, he will find the judgment of antiquity to be correct; for the benefits derived from inventions may extend to mankind in general, but civil benefits to particular lands alone. The latter, moreover, last but for a time, the former forever. Civil reformation is seldom carried on without violence and confusion, while inventions are a blessing and a benefit without injuring or afflicting any."—*The Canadian Manufacturer.*

The Carbonization of Wool.

The successful extracting of cotton from union cloths without injury to the reclaimed wool has led to the extension of the process to raw wool for the purpose of ridding it of burrs and other particles of vegetable matter. These burrs are very difficult to remove, and often leave a large amount of waste during the process of extraction, while, if allowed to remain, they would do incalculable mischief to the yarn. There are two methods of dealing with them in general use—one is to pass the wool through a burring machine, which beats the burrs from the wool; and the other is to destroy the burrs by carbonization. The former method is most suitable when the wool contains large burrs; but carbonization is more economical for wool containing small burrs, straw, chaff, and other small particles of matter. One drawback in using the burring machine is that many of the smaller burrs adhere to the wool after being passed through the machine, and carbonization is afterward resorted to, in order to reclaim the wool attached to them. For this and other reasons the chemical process is likely to totally supplant the burring machine in course of time. The process generally adopted is similar to the one followed in making extract wool. The burry wool is first saturated with a dilute solution of sulphuric acid, whizzed in a hydro-extractor, and afterward opened out and spread in a heated room. Here chemical action is quietly at work, the burrs are deprived of their hydrogen, and crumble to carbon, while the wool is liberated and washed.

Another method which finds favor is to saturate the wool with a solution of chloride of aluminum (Al_2Cl_6). After being whizzed and dried, it is taken to a room heated to about 200° F., where it remains for a little less than an hour. Washing in fuller's earth and water follows, by which the chloride is removed and the residue of carbonized matter washed away. The prejudice which formerly existed against these methods of extracting burrs is rapidly disappearing, as experience has proved that if the wool be properly clean previous to carbonization, and the acid the required strength, no injury to the fiber is caused, neither is the felting of the wool in any way destroyed.

Convention of the National Association of Inventors.

On January 19 of the present year, the National Association of Inventors held their first annual meeting. This body is the outcome of the Patent Centennial which met at Washington last winter. The list of officers includes distinguished names. The President, Dr. Gatling, of Hartford, Conn., known as the inventor of the Gatling gun, occupied the chair, and was the writer of the presidential address, which was read by the Commissioner of Patents, Hon. George E. Simonds. Other officers of the association are as follows: Vice-Presidents, Hon. Gardner D. Hubbard, president of the American Geographical Society; Wm. A. Anthony, president of the American Institution of Electrical Engineers; Thomas Shaw, of Philadelphia, inventor; and Hon. Benjamin Butterworth, secretary of the World's Fair; Secretary, Prof. J. E. Watkins; Treasurer, Mr. Martin E. Stone.

The president's address touched upon the propriety of liberal treatment of inventors, the necessity for increasing the number of Patent Office examiners, and the necessity of a special patent court. The World's Fair and the exhibition of the results of American invention were also spoken of. Informal discussions of the work of the two main committees on legislation and manufactures occupied much of the time of the meeting, and finally an adjournment was taken for one year, to meet again in Washington.

A WELL known business man, referring to the success of his firm, said: "We attend to our own business and nothing else. You never hear of any of us being on the road nor out driving. We do not go to the theater. We have no outside business—no ventures or speculations in oils, wild lands, patents or stocks. What money we have we have put into our house. We take care of our business and our business takes care of us. We keep abreast of the time."