tioned have, in exceptional cases, run as rapidly as a mile in a minute, with moderate loads. Such speeds are, however, uncommon in this country, and though a few locomotives were used a while here with drivers seven feet in diameter, they were all changed, and the prevailing size is now from five and a half to six feet for passenger traffic. In England, however, where the average speeds are higher, locomotives have been made with drivers nine and ten feet in diameter, and many are still running which are seven feet and upward.

In order to attain a given power a large driver requires proportionately large cylinders, and consequently great weight. The general introduction of the link with its incidental steam cushioning, and the more general understanding of the principles involved in balancing the reciprocating parts, have made it possible to greatly increase the number of strokes per minute made by locomotive engines. This permits the use of smaller drivers, but at the same time makes it difficult to obtain a desirable area of port to prevent excessive back pressure. A port area one tenth that of the cylinders give excellent results for a piston speed of 600 feet per minute. It is difficult to make the ports larger than this, for the reason that the length can scarcely be more than the diameter of the cylinder, and an increase of width involves tremendous wear on the valve and links; so occasionally the above proportion of port has been used for piston speeds of 1,000 feet per minute, and the attendant disadvantages are believed by many engineers to be less than in the system based on very large drivers.

SCIENTIFIC INTELLIGENCE.

PREPARATION OF STRONTIUM.

Benno Franz prepares larger quantities of strontium by decomposing strontium amalgam at a low red heat in a current of dry hydrogen gas. It is best to perform the reduction in an iron Rose crucible with a perforated cover. To prepare the amalgam, heat sodium amalgam in a saturated solution of chloride of strontium to 194° Fah. (90° Cen.), and repeat the operation several times. Collect the product and dry between layers of blotting paper. The amalgam of strontium is more rapidly decomposed than the corresponding sodium or barium compound, and must therefore be carefully sealed up until ready for use.

Prepared in this way, strontium is a faintly yellow metal, similar to barium, and can be easily hammered to thin leaves. It oxidizes in the air very rapidly; if held in the hand it evolves heat to such a degree that it soon becomes necessary to drop the metal. It burns in the air with intense light and remarkable scintillations. It fuses at a gentle red heat, and is not volatile at a clear red heat. The specific gravity of the metal is 2·4.

RED DYE FOR LEATHER, IRON, WOOD, ETC.

M. Pushner recommends picric acid for this purpose.

Dissolve 4 grammes picric acid in 250 grammes boiling water, and add, after cooling, 8 grammes aqua ammonia. For the second bath, dissolve 2 grammes of crystallized fuchsine in 45 grammes alcohol, and dilute with 375 grammes hot water, and finally add 50 grammes of ammonia. As soon as the red color of the fuchsine has disappeared, mix the two baths and immerse the articles to be dyed. For ivory and bone the bath ought to be made slightly acid with nitric or hydrochloric acid. On adding gelatin to the bath it can be used as a red ink.

RECOVERY OF OXALIC ACID FROM MADDER.

Madder contains considerable oxalic acid in combination with lime, which is set free by the hydrochloric and sulphuric acids employed in the extraction of the coloring matter. By conducting the acid after the removal of the dye into water saturated with milk of lime, we shall obtain a voluminous precipitate of the oxalate of lime. This can be again decomposed, by an equivalent proportion of sulphuric acid, and after filtering off the sulphate of lime, the oxalic acid can be recovered by evaporating in leaden pans and afterwards purifying by successive crystallizations.

IF THE EARTH WERE TO STAND STILL.

If the revolution of the earth on its axis were to be suddenly stopped, the temperature of everything would be raised to such a degree as to be incapable of existing in any other form than vapor. When a bullet strikes the target it becomes so hot that it cannot be held in the hand. Its velocity is at the rate of 1,200 feet a second, but what must be the heat produced when a body like the earth, moving at the rate of 90,000,000 feet a second is suddenly arrested! It would soon be converted into a sea of fire and all life would become extinct.

It is not probable that this catastrophe will take place in our generation, but as the light of the sun is said to be due to the combustion of worlds in its atmosphere, our time may sometime come to add fuel to the flames.

PURIFICATION OF GLYCERIN.

To purify glycerin which has been for sometime in use, add 10 pounds of iron filings to every 100 pounds of the impure liquid; occasionally shake it and stir up the iron. In the course of a few weeks a black gelatinous mass will collect on the bottom of the vessel, and the supernatant liquid will become perfectly clear, and can be evaporated to remove any excess of water that may have been added to it.

The employment of glycerin to improve the taste of wine is now very extensive. It is preferred to sugar for the reason it cannot be fermented. Hence the necessity of having a perfectly pure article.

OZONE.

This mysterious element appears capable of many uses, and a way to make it in large quantities and at reasonable rates, would be welcomed by a large class of manufacturers.

At a recent meeting of the Lyceum of Natural History in New York, Mr. Loew exhibited a method by which it was claimed that ozone could be obtained in any quantity. He assumed that during a certain stage of the combustion of gas, ozone was generated which was afterwards destroyed in the upper part of the flame. By tapping the cone of light at the right point, we can draw off the ozone. This was accomplished by blowing through the flame of a Bunsen burner and collecting the product in a long glass jar. In this way sufficient gas was collected in the jar to show by its odor and by the usual tests that ozone was present. This method of obtaining ozone is entirely new, and if it should prove to be practicable, will be an important discovery.

It has recently been discovered that if picric acid be projected into a jar of ozone, an instantaneous explosion takes place. This is certainly a curious and unexpected reaction and may lead to new applications of ozone as an explosive agent for powders prepared for the purpose. The whole question of the existence and properties of ozone is still very obscure, and now that the author of the leading researches upon it, Professor Schoenbein, is dead, we must patiently wait for some new investigator to take up the subject.

PATENT OFFICE DECISIONS.

SEED PLANTER.

In the matter of the application of D. W. Hughes for the extension of letters patent granted to him for improvement in hand seed planters Nov. 20, 1869.—Applicant is the inventor of a cheap, simple, and useful device for planting seed by hand.

The novelty of this device is sufficiently established, and the utility is evident. During the seven years that applicant made use of his invention by manufacturing and selling the planters, he realized a net profit of some $12,000. It appears that a large number of machines have been manufactured without his consent, the royalty upon which, at the rates which he established would amount to about $12,000 more. If the seven years, during which time he received nothing from his patent, had been diligently employed, and proper precautions had been taken against infringers, the patentee would doubtless have been able to realize a profit of from between $50,000 and $100,000 from his invention. The years of the war were the harvest time of the manufacturers of agricultural implements. As stalwart farmers were metamorphosed into soldiers, wood and iron were transmuted into farmers.

The applicant now seeks an extension of his patent for seven years, in order to regain the seven lost years of his original term. It becomes important, therefore, to inquire how these seven years were spent. Since the patent was never sold, but has been, from first to last, in the hands of the patentee, the burden is on him to show that the benefit which he might have derived from the use of his invention during half of the life time of his patent was not lost through any fault or neglect of his.

Applicant was a machinist. He resided in Palmyra, Missouri, and carried on the manufacturing of these implements. In 1856, he sold of these planters 100; in 1857, 800; in 1858, 1,500; in 1859, 2,000. Here was a rapid increase of sales, and every indication of a growing and prosperous business. In 1860, however, applicant concluded to abandon this business, and to go into mining in New Mexico. This he did, leasing his patent to a firm in Palmyra for one year.

Upon the breaking out of the war, he returned to the States, to make some purchases for his mines. He appears to have made no inquiry after his lessees or their business; but shortly afterward, under pretense of a desire to communicate with New Mexico *via* Texas, he voluntarily went, by way of St. Louis, Louisville, and Nashville, to Memphis, Tenn., which city was at that time in the hands of the enemy. At that place he went to work in a gun factory, but presently departed for Jackson, Miss., where he was engaged "most" of his time "in making, altering, and repairing patterns of different kinds, such as cotton presses, machinery, ordnance stores, cannon castings," etc., understanding that he was, by virtue of his employment, exempt from conscription.

About six months before the taking of Jackson by the United States forces, applicant went to Montgomery, Ala. His principal reason for leaving was, that he "expected Jackson would be taken, and there would be some fighting." He adds, "I feared getting hurt." In Montgomery, he engaged in manufacturing machinery on his own account, and by his machinery making castor and peanut oil. Subsequently he manufactured artificial limbs. After the war, there being no more danger of getting hurt, he returned to Jackson, where he remained until 1867, when he came North, and in 1868 and 1869 again made and sold his planter.

Once, and once only, during the war, he attempted to leave the South. He walked up the railroad, how far he does not say, when, finding he could not, within the enemy's lines, exchange their currency for United States notes, he "turned back, and concluded to remain, until the war was over."

It is only necessary to state, in order to complete this story, that applicant's father and brother, finding this abandoned invention lying idle, took it up, upon their own responsibility, and manufactured about one thousand machines per annum, and made money at it, while the owner of the patent was turning gun barrels, and repairing patterns for ordnance stores and cannon castings, and manufacturing artificial limbs for his country's enemies.

He now asks that that country may be taxed for seven years more, to enable him to reap from this invention the profit which he lost while endeavoring, to the extent of his ability, to destroy the Government whose favor he invokes. The novelty of the demand to be paid, in this form, for his services to the enemy, is only equaled by its effrontery.

The extension is refused.

SAMUEL S. FISHER, Commissioner.

PAVEMENT.

In the matter of the application of Louis S. Robbins for letters patent for improvement in street pavements.—This invention is alleged to consist in a new form of block for wood pavements.

Before the invention of applicant various forms of blocks had been used, the purpose of which was to provide a channel between the blocks at the top, and extending about half way down, which should be filled with concrete, and, by interrupting the surface of the pavement, form a foothold for the feet of horses.

One of these forms was made by cutting a piece from the upper half of the block on opposite sides, so as to form a shoulder, and so that, when two blocks were abutted, the lower halves would be united to form a solid foundation, while a channel would be formed between the upper halves of double the width of the shoulder upon each of them. This was illustrated in Stead's English patent, and Perkin's rejected application.

Another form was that shown in the patent of Nicolson. Long blocks and short blocks were placed in alternate rows, so that the base was solid as before, while a channel was formed between the upper portions of the long blocks.

Applicant forms a shoulder upon one side of the block only. His block is one half of Stead's block, or Stead's block represents two of his placed back to back. He places the blocks in rows, so that he obtains the usual solid base and channel near the top.

In all these cases the concrete is poured into the channel or space between the upper portions of the blocks, and rests upon the solid shoulder; or, as in Nicolson's case, upon the top of the short block. The space between the blocks is, in Stead's case, in the center of the channel; in Nicolson's, on both sides of the channel; and in applicant's, on one side only.

Here are slight differences in construction, but identity of principle. All of these blocks accomplish the same purpose in the same way, or substantially in the same way.

This is not the case of a difference of form involving a new mode of operation. It is a mere difference in the mode of constructing a channel, which, when made, is of the same form as those already well known. The duplication of the shoulder in the block would not have been an invention, and I do not think the omission of one shoulder involves more thought, or a higher quality of thought, than the addition.

The decision of the Examiner-in-Chief is affirmed.

SAMUEL S. FISHER, Commissioner.

UMBRELLA.

In the matter of the application of R. O. Lowry for letters patent for improvement in umbrellas.—The applicant states as follows: "The object of my invention is to produce an umbrella that will neither absorb water nor lose its colors. To accomplish this, I first make my umbrella water-repellent and fast-colored, or either, by means of the application thereto of soap, or of soap and gelatin, in combination with alum, or sulphates, or acetates alone, or with salt or other substances having a saline quality.

"What I claim is, an umbrella having its cover made water-repellent and fast-colored, or either, by means of the application thereto of soap, or soap and gelatin, in combination with alum, or sulphates, or acetates alone, or with salt or other substances having a saline quality, as herein described."

The reference is to a provisional specification No. 542, of 1857, in England. As no patent was granted, the objection cannot be that the invention has been patented abroad, but that it has been described in a printed publication.

This invention was for an improvement in umbrellas, by the use of a peculiar fabric. "For this purpose the weft used is of single yarn, produced from dressed or hackled silk waste, dyed by preference in the hank, sliver, or rove. The warps are of cotton or linen yarn, by preference doubled, or what is called lace cotton yarn, suitably dyed. These warp yarns are put through a solution of what is known as aluminous soap, to give the same a resisting power against rain [etc.]."

Applicant, in argument, states that his process consists in treating the entire fabric first with soap, and afterward with alum, or sulphates, etc. In this way he claims that the soap becomes curdled, or a compound is formed insoluble in water, which renders the umbrella water-repellent. He argues that the aluminous soap referred to in the reference is so vaguely described as to be incapable of identification, and insists that if it was a soap as stated, it must have been soluble in water, and must have attracted the water instead of repelling it; that the language, "put through a solution of what is known as aluminous soap," in no way describes his process, nor could such manipulation have produced the result at which he aims.

There would be great force in this position if applicant had described his process in his application as he does in his argument. I am inclined to think that the term "aluminous soap" in the reference, does not import a treatment of the fabric first with soap and then with alum, nor do I believe, the result of the two modes of treatment would be the same.

But applicant, in the actual description of his process, is as wide of the mark as the English specification. The substance of his entire description is that he makes his umbrella water-repellent by means of the application thereto of soap, in combination with alum. Now, would any one infer from this language that he meant to treat his umbrella first with soap, and then with alum? I think not. If sufficient alum were added to curdle the compound, before application to the umbrella, it could not be applied at all. The only fair inference would seem to be, that so much alum only was to be combined with the soap as not to destroy the quality of the article as soap; in other words, to use "aluminous soap" like the Englishman.

In view of this description of the process, I think the reference was pertinent.

The decision of the Board of Examiners-in-Chief is affirmed.

SAMUEL S. FISHER Commissioner.

NEW BOOKS AND PUBLICATIONS.

A TREATISE ON ASIATIC CHOLERA. By C. Macnamara, Surgeon to the Calcutta Ophthalmic Hospital. London: John Churchhill & Sons, New Burlington street. Calcutta and Bombay: Thacker, Spink & Co.

This work is a large octavo, embodying conclusions drawn from fifteen years' experience and practice in the endemic area of cholera. The work commences with a definition and description of the disease, its various forms, and the modes by which it is transmitted. This is followed by an historical account of cholera, containing particulars of the most destructive epidemics on record, with their bearings on the etiology and mode of propagation of the disease. The geographical distribution of the disease is next given, with the countries hitherto exempt from it. The important subject of meterological influences, as influencing or retarding the spread of the disease is next discussed, and forms a most interesting and valuable portion of the work. The characteristic features of Asiatic cholera, post mortem conditions of the bodies of those who have died at various stages of the disease, the etiology of cholera, and, finally, its symptoms and treatment are discussed at length. The latter discussion includes the consideration of preventive measures, based on the laws of communicability of cholera, quarantine, purification of water, and disinfection. This work is an important one, and will, doubtless, become an accepted authority upon the subject of cholera.

TOWNSEND'S FOLDING GLOBE. Patented February 16, 1869. Manufactured and sold by Dennis Townsend, Felchville, Windsor county, Vt.

This is a novel and ingenious invention and publication, designed to place a cheap and convenient substitute for the revolving globe. The surface is composed of ellipsoid segments, the edges of which are attached to each other by tapes, and the whole may be flattened together so that it may be placed within the covers of a book. When it is desired to use it by drawing upon small rings inserted at the poles the whole assumes the globular form, presenting to view seas, mountains, continents, and other geographical features of the globe.

NATURAL HISTORY OF THE HUMAN RACES, with their Primitive Form and Origin, Primeval Distribution, Distinguishing Peculiarities, Antiquity, Works of Art, Physical Structure, Mental Endowments, and Moral Bearing. Also, an Account of the Construction of the Globe, Changes of its Surface, Elevations of its Mountains, and Subsidence of Land; together with other interesting matter. Illustrated by Colored Plates of each Type. With numerous Engravings representing their varied forms. By John P. Jeffries. One volume, 8vo; pp. 380; cloth. Price, $4·00. Published by S. R. Wells, 389 Broadway, New York city.

This book contains a great deal of rare and valuable information concerning the history of our race, and in respect to which the mass of mankind know but very little.

THE MEDICAL ADVISER. A Full and Plain Treatise on the Theory and Practice of Medicine, especially adapted to Family Use. By Rezin Thompson, M. D., Member of the National Medical Association, and author of "Thompson on Fever," etc. Chicago: Jones, Jenkins & Co.

We have received from the National Publishing Company specimen pages of this book. It promises to be a hand-book of useful sanitary information for domestic use. It is to be illustrated with engravings representing parts of the human anatomy, botanical specimens, parasites peculiar to certain diseases, etc., and gives plain and simple directions for the treatment and prevention of ordinary diseases.

PHOTOGRAPHIC MOSAICS FOR 1870. Philadelphia: Benerman & Wilson.

We advise every photographer to supply himself with a copy of this admirable little book. It is a complete record of the progress made in the art during the past year, and contains many valuable recipes and instructions.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

WOOD-BENDING MACHINE.—James W. Martin, Philadelphia, Pa.—This invention relates to a new and useful improvement in machines for bending wood, designed more especially for bending handles of umbrellas, parasols, and canes, but applicable to many other purposes.

STEAM ENGINE.—J. E. Culver, Hudson City, N. J.—This invention relates to a new high pressure engine, which can be worked either by steam alone or by water and steam combined.

COMBINATION TOY.—Robert Went, Williamsburgh, N. Y.—This invention relates to a new and useful improvement in a combination toy, and consists in operating (on two wheels which revolve on an axle) a revolving swing and revolving horizontal tables, both swing and tables being designed for any figures representing children, birds, or animals.

MACHINE FOR FORGING AUGER BITS BY MEANS OF ROLLS.—James Swan Seymour, Conn.—This invention relates to a new and useful improvement in a machine for forging or forming the tips or cutting ends of auger bits.

PUMP.—Morgan P. Hall, Gayville, Ill.—This invention relates to a new and useful improvement in pumps for raising water and other liquids.

SELF LOCK FOR BASEMENT GATE.—James A. Clark, New York city.—This invention has for its object to furnish an improved lock for basement gates, which shall be so constructed and arranged that it can not be opened from the outside of the gate and will always lock itself when the gate is closed.

SPOKE-SMOOTHING MACHINE.—Horatio Keys, Terre Haute, Ind.—This invention consists of an improved arrangement of apparatus for slowly moving the spoke held in centers at the end lengthwise along, and turning it in contact with a polishing belt moving rapidly across it, the said apparatus being guided by a pattern to move the spoke to or from the belt according to the variations in the shape of the said spokes, so that the pressure against the belt will always be the same and the effect thereby rendered uniform. The invention also comprises a certain means for reversing the movements of the spoke carrying devices, for moving the spokes longitudinally back and forth; also, certain means for throwing the spokes away from contact with the belt at the end of each longitudinal movement, and for automatically stopping the longitudinal movements at the end of the same in each direction.

FLOUR BOLT.—A. J. Dibble, Franklin, N. Y.—This invention consists in the substitution of coarse oil cloth at the tail end for the silk commonly used thereat for separating the tailings from the bran, and in the addition hereto over the said wire cloth and on an enlarged portion of the reel, of