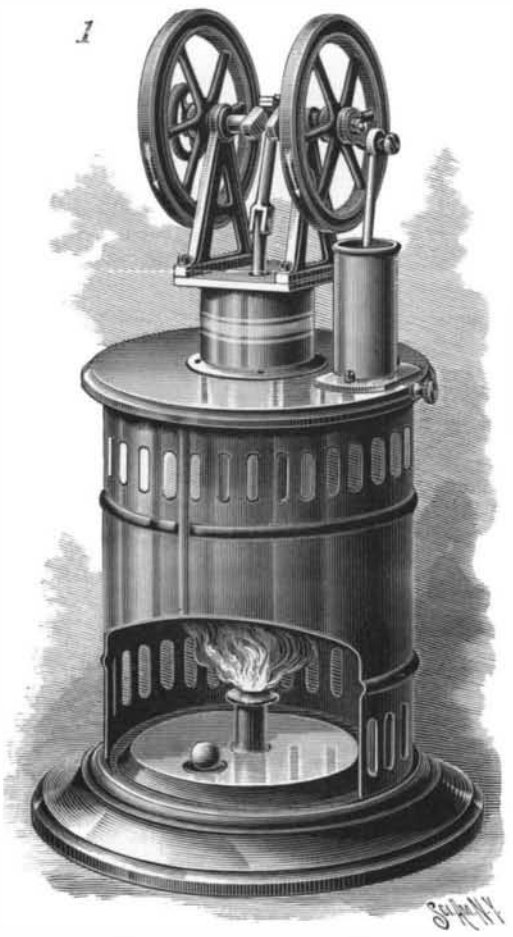
oval crown, a contour which has proved very popular with the public. The tendency of the day being toward double crowns, the manufacturers of the wheel have designed a double oval fork crown which is a solid one piece drop forging, and is therefore naturally of great strength, while the distribution of the material into two arcs of different radii introduces the truss element at least for some of the strains. Independent of its utility, the double oval crown certainly constitutes



SMALL CALORIC ENGINE.

a very characteristic and handsome feature of the wheel.

A good example of how the flush joint is carried out and with what neat effects may be seen in Fig. 6. Here we have a boltless connection at the head of the center brace, with flush jointed rear stays. At first sight, it might seem a mystery how the saddle post is held in shape. The bolt head seen on top of the saddle post explains it. By turning this in one direction, a taper plug is drawn up into the lower end of the seat post, expanding it against the walls of the tube and fixing the seat post in position. By turning the bolt in the opposite direction the cone is forced downward, leaving the seat post free for adjustment. Nothing can be neater or more efficacious than this substitute for the old time cross bolt, which has so often been a source of annoyance.

With the many special and exclusive features the Kensington is regarded as one of the leaders in high grade cycle circles of to-day.

The Kensington bicycle is manufactured by the Martin & Gibson Manufacturing Company, of Buffalo, N. Y.

TWELVE WHEELED AMERICAN LOCOMOTIVE FOR THE BRAZIL RAILWAY.

Reference is made elsewhere in our columns to the trade with foreign countries in American locomotives; a trade which there is reason to believe is yet in its infancy, and will assist in the future to keep in full employment those vast establishments which have supplied the motive power to the 180,000 miles of railroad which form the system of this country.

The accompanying illustration shows a powerful locomotive of the Mastodon type, which has recently been built by the Brooks Locomotive Works, of Dunkirk, N. Y., for Estrada de Ferro Central do Brazil (Brazil Central Railway). This company is one of the leading American exporters of locomotives, and, in addition to its trade with the Spanish American states, it has recently made shipments to Japan, a country which of late has shown a disposition to make increasing use of American locomotives.

The subject of our illustration is a twelve wheeled freight locomotive, with cylinders 21 inches in diameter by 26 inches stroke. There are 8 coupled drivers, loaded to 142,000 pounds, and a leading truck carrying 28,000 pounds. The weight of the tender is 82,000 pounds, the total weight of engine and tender, in working order, being 252,000 pounds.

The boiler is of the Belpaire pattern, and is 5 feet 8 inches in diameter, the fire box being 38½ inches wide by 114 inches in length. There are 248 flues, 2¼ inches in diameter by 13 feet 10½ inches in length. There are 209 square feet of heating surface in the fire box and 1,991 square feet in the tubes, or a total of 2,200 square feet. The grate area is 29 5/10 square feet, and the boiler pressure is 180 pounds.

Water is fed to the boiler by injectors and by feed pumps worked from the crossheads. With few exceptions, this handsome locomotive conforms to the standard American Mastodon type, the chief difference being in the width of the gage, 5 feet 3 inches, and the use of a pair of buffers above the pilot and on the rear of the tender. Another peculiarity which will be noticed is the use of three headlights, two of which are located at the base of the smoke box.

The hauling capacity of these locomotives on a straight, level road, at 10 miles an hour, is about 5,073 tons, exclusive of the weight of the engine and tender.

A MINIATURE CALORIC ENGINE.

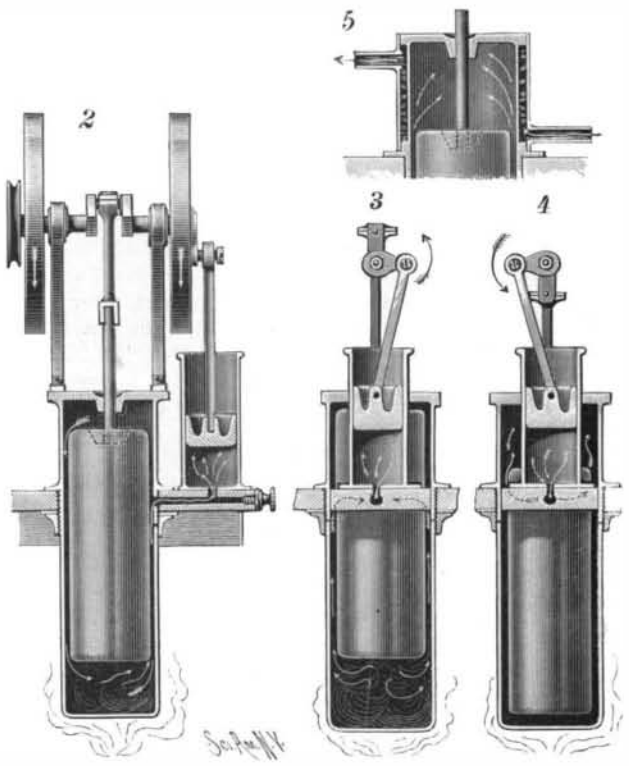
The hot air engine is not a very recent invention. A number of engines of this class, of different sizes, were devised and used in the early part of the present century, and in the latter part of the last century there were in existence engines constructed to be operated by the expansion of air.

Nothing in the way of a motor, aside from a windmill or water wheel, can be more simple than this, and it is a pity that it is not capable of more general application. Motors of this kind have been used to some extent for driving light machinery, and they have been largely employed in pumping water.

Quite recently caloric engines have been made in the form of a toy, as illustrated in the larger of our engravings. In the motor here shown, the air contained in the expansion cylinder is alternately heated and cooled, and no fresh air is introduced. This action is so rapid in a small engine that the crank shaft can make 600 or 700 revolutions a minute. By examining the sectional views (2, 3 and 4) a good idea of the construction and operation of the motor may be obtained. In brief, the larger and longer of the two cylinders (the expansion cylinder) contains a long hollow piston called the "transfer piston," which fits the cylinder very loosely. To this piston is attached a rod extending through a close fitting sleeve in the top of the cylinder, the piston rod being provided with a connecting rod fitted to the crank at the middle of the shaft. The upper part of the expansion cylinder is furnished with a wide flange forming a cap which fits over the sheet iron fire box, and to the top of the expansion cylinder are secured the standards in which is journaled the crank shaft.

To the flange is attached the power cylinder, which is shorter and smaller in diameter than the expansion cylinder. This cylinder is provided with a piston to which is pivotally connected the lower endof a connecting rod. the upper end of which receives a crank pin projecting from one of the fly wheels at right angles to the transfer piston crank. A hole bored in the flange connects the expansion cylinder and the bottom of the power cylinder, as shown in Fig. 2, and the outer end of the hole is stopped by screw plug which can be removed for cleaning the hole, should it becomed stopped by oil or otherwise.

An alcohol lamp is provided for heating the expansion cylinder, it being placed in position to heat the lower end of the cylinder, as shown in the larger view. The top of the lamp is provided with a hemispherical cavity, at the bottom of which is the aperture for filling.

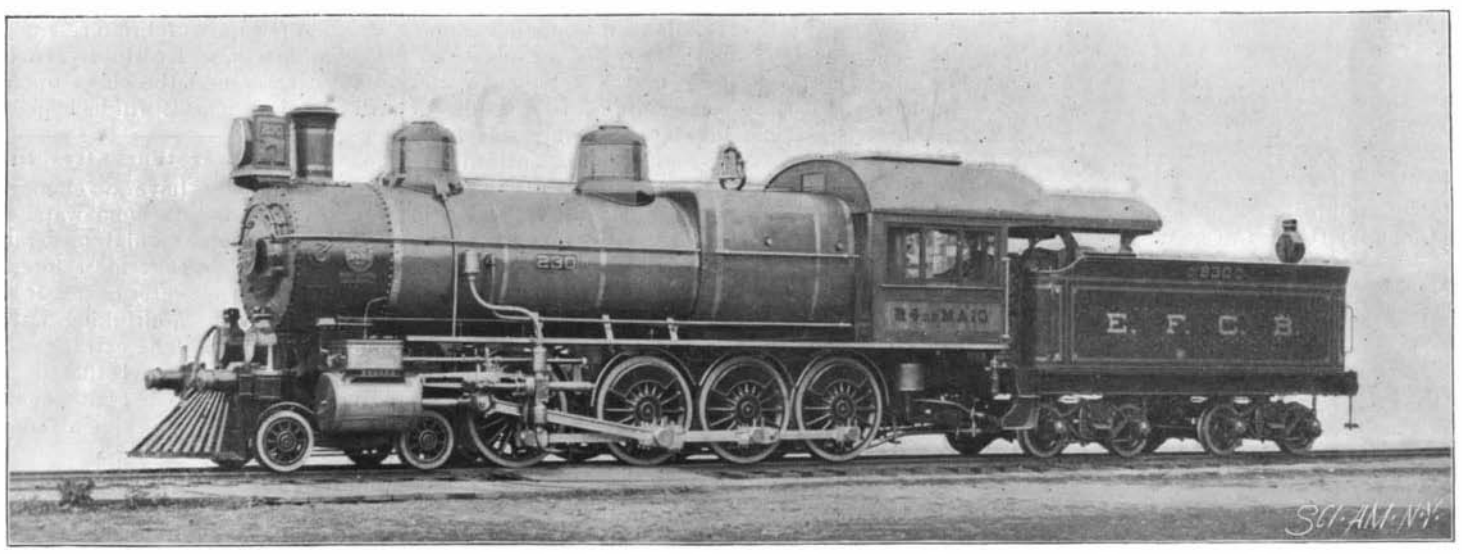


SECTIONAL VIEWS OF SMALL CALORIC ENGINE.

The stopper consists of a marble dropped into the hemispherical cavity and serving the double purpose of stopper and safety valve.

The expansion and power cylinders contain a certain amount of air which is never changed during the operation of the engine, except by expansion and contraction. Heat having been applied to the lower end of the expansion cylinder, the engine is started by giving the crank shaft one or two turns in the direction indicated by the arrows on the rims of the fly wheels. The air at the top of the expansion cylinder is transferred to the lower end of the cylinder by the transfer piston as it rises; at the same time the power piston descends, and by this time the air is heated in the lower part of the expansion cylinder and begins to expand. The power piston is in position to be pushed up by the air pressure. As the power piston reaches the upper end of its stroke, the transfer piston descends and transfers the heated air to the upper end of the expansion cylinder, where it is cooled, thus reducing the pressure and allowing the power piston to descend again. This operation is repeated at every stroke. It is almost impossible to believe that the air can be heated and cooled so rapidly.

The efficiency of the motor can be increased by surrounding the upper portion of the expansion cylinder by a water jacket provided with a water supply pipe at the bottom and a discharge pipe at the top, as shown in Fig. 5, and keeping a continual flow of cool



TWELVE WHEELED AMERICAN LOCOMOTIVE FOR THE BRAZIL CENTRAL RAILWAY.

Cylinders, 21 inches by 26 inches; diameter of boiler, 5 feet 8 inches; heating surface, 2,200 square feet; grate area, 29·3 square feet; diameter of drivers, 54 inches; weight of engine, 170,000 pounds; hauling capacity, 5,073 tons at ten miles an hour on level.

water through the jacket. When the motor is used for pumping, the water is forced through the jacket.

This little motor is only a toy, but it very completely illustrates the principle of one of the most successful hot air engines ever devised. If the reader is mechanically inclined, he may make a motor on this plan on a much larger scale, and use it for driving machinery. There can be no doubt about its successful construction or operation, if it is made airtight and the bearings and friction surfaces are made to run free. The proportions may be about the same as shown in the cut.

The dimensions of the motor from which the views were made are as follows:

	Inches.
Length of expansion cylinder	4¾
Internal diameter of expansion cylinder	1 5/16
Length of transfer piston	2 1/16
Diameter of the transfer piston	1¼
Length of power cylinder	1¾
Diameter of power cylinder	1 1/16
Length of the cranks	7/16
Diameter of fly wheels	3
Height of firebox from base	5½

Recent Patent and Trade Mark Decisions.

Standard Cartridge Company v. Peters Cartridge Company (U. S. C. C. A., 7th Cir.), 77 Fed., 630.

Application to Circuit Court for Letters Patent.—Where the defeated applicant for a patent, after interference proceedings in the Patent Office, filed a bill in the circuit court for a patent, the decision of the Patent Office on the ground of priority is presumptively correct and the burden is on the complainant to establish his case by testimony which carries conviction.

Effect of Reduction to Practice.—Where the complainant was the first to conceive the invention and to give it such substantial expression that without further invention one can construct a machine embodying the invention, and he disclosed the same to the defendant, who appropriated the idea, it is then immaterial that the defendant made the first machine and filed the first application. Under such circumstances the defendant cannot avail himself of the complainant's neglect to push his conception to completion and promptly file an application. But, if ineffectual efforts were made to give the idea form in drawings, models or machines, and are abandoned before reaching such a stage of completion as to require only mechanical skill to carry the conception to success, the claim of priority cannot be sustained against a later independent conception carried into practical form at an earlier date.

What Kind of Conception Constitutes Invention.—The mere existence of an intellectual notion that a certain thing could be done, and, if done, might be of practical utility, does not furnish a basis for a patent or estop others from developing practically the same idea.

Burden of Proof in Interference Cases.—The burden is on the second reducer to practice to show prior conception by him and to establish the connection between that conception and his reduction to practice.

Proof of Due Diligence.—That may be accomplished by the exhibition of drawings and by oral explanations antedating the first reduction to practice by another. If the one who first conceived an idea of an improvement of an old machine by sketches showing so clearly the novel features of his improvement that a person could construct the improvement without exercising his inventive faculty, then such person is entitled to carry the date of his invention back to the date of the drawings. And it is not fatal if the drawings do not in all respects show the relation of the new parts to the old, nor exactly describe the mode of attachment, if the absent features are such as would be readily supplied by a mechanic.

Cartridge Loading Machines.—The Ligowsky patent, No. 464,883, has been held properly issued to him rather than to Charles S. Hisey.

Westinghouse Air Brake Company v. New York Air Brake Company (U. S. C. C., N. Y.), 75 Fed., 616.

Air Brakes.—The Westinghouse patents, Nos. 360,070 and 376,837, for fluid pressure automatic brakes, have been held valid and construed.

National Folding Box and Paper Company v. Stecher Lithograph Company (U. S. C. C., N. Y.), 77 Fed., 828.

Paper Box Machines.—The Munson patent, No. 259,416, for improvements in the manufacture of paper boxes consisting chiefly in the formation of the dies for cutting out and creasing the box blanks, that is in providing grooves in the counter die of the machine to co-operate with the embossing rules of the die for creasing the box blanks, is void for want of invention.

Olmsted v. A. H. Andrews Company (U. S. C. C. A., 7th Cir.), 77 Fed., 835.

What Constitutes Invention.—It is not invention to cause a device to work vertically that theretofore operated horizontally, nor to make a thing, such as a map case, neat and compact in form, light and attractive and so it can be handled and changed about without displacing the map within. The protection of the statute is granted for things invented, not for things produced. The latter belongs to the domain of mechanical skill only. Utility is not an infallible test of invention.

Acquiescence in Rejection of Claims.—The claims must be construed in the light of the proceedings in the Patent Office, and if the applicant has acquiesced in the rejection of any feature because it was old, or of any claim in which a certain thing was the essential feature, he cannot afterward claim what was thus rejected.

Map Case.—The Nutting patent, No. 343,060, is void for want of patentable invention over the prior art.

Boston's Gas Explosion.

The fire marshal of the city of Boston has made his report on his findings after a thorough investigation of the gas explosion of March 4, which caused ten deaths and injury to fifty persons. The fire marshal finds that the accident was due to the lax method of inspection pursued by the transit commission. Judge Ely, of the Municipal Court, has investigated the explosion. His decision holds that the Boston Gas Light Company was chiefly to blame for the disaster. Both decisions will be very important when the suits for damages come to trial. These suits will reach into the millions in the aggregate. Judge Ely, in reviewing the evidence, says:

"I find that the section 4 of the subway could have been built with safety under the requirements of the contract made for its construction with the Metropolitan Company, if proper precautions had been made.

"I find that the Boston Gas Light Company knew further that in the construction of the subway these pipes and mains were in constant danger; that if they left them to the care or carelessness of the contractor, and their men, they committed them to inexperienced hands, and that thereby great dangers constantly menaced the people."

In commenting upon the different phases of the accident and the contributory causes the judge says:

"The two broken gas mains had been in the ground and in use for 35 or possibly 40 years. They were cast horizontally, with the usual result of being of uneven thickness, the lowest part of the casting as it lay in the mould being the thickest part, and the casting gradually diminishing in thickness till it became thinnest at the highest part.

"At the first or westerly break in the 6 inch gas main, the good iron was only ⅛ inch thick at the thinnest part. Originally it had been about ¼ inch thick, but, either by reason of an old break, extending partly through the pipe, or other cause, the pipe had rusted half way through."

The fire marshal, however, says: "They (the transit commission) should have kept careful and incessant watch. The failure of the transit commission, holding as they did the strongest fiduciary relations to the public to adopt precautionary measures, seems to me, in the light of the evidence presented, to constitute inexcusable neglect on their part. Whether the legislative act creating the commission or the common law itself imposed any obligations upon the gas company with reference to the care of their pipes or not, it was the duty of the transit commission, it seems to me, to whom the public had the right to look for protection from subway dangers, to guard against such.

"I have been unable to learn that there had been any inspection of the pipes and their supports by the transit commission or their agents within twenty-four hours preceding the explosion."

Is Rhodesia Ophir?

The "Monomotapa," which forms the subject of Mr. A. Wilmot's new book, is the modern Rhodesia, says the London News. The work, to which Mr. Rider Haggard contributes a short introduction, has nothing to do with the Chartered Company. It ends with 1830, when the last Dominican monk left Monomotapa, and is entirely concerned with the identification of the land with the "Ophir" of Solomon and the ancient Phenicians. It contains the results of Mr. Wilmot's researches into such literary references to Monomotapa as are to be found in the Vatican and Lisbon libraries.

It is likely that Rhodesia will become a fruitful field for the archæological digger, as well as for the digger after gold. The archæologist Mr. Bent, who in 1891, after the occupation of Mashonaland, was one of the first modern Europeans to examine the wonderful ruins of Zimbabwe, has proved (to the satisfaction of most authorities) that these buildings were either by the Phenicians or by a people (Arabian) whose worship was the same as theirs. The most probable, though not the absolute, conclusion is held to be that Monomotapa was not only Phenician, but also that it was the Ophir mentioned in the Old Testament.

Mr. Wilmot has been able to prove that the Portuguese settlers of the sixteenth century had visited Zimbabwe, and that the place was then and for generations after occupied by the King of Monomotapa. In the seventeenth century the native population, from which the Mashonas of to-day are descended, was overrun by a savage, fierce race, which is now represented by the Matabele and other Zulu tribes. The new invaders are described as the Huns of South Africa. Portuguese civilization, such as it was, disappeared before them, and the very name of the old native kingdom was forgotten until the period of British expansion and exploration began.

The architecture and decoration of the Zimbabwe ruins are the same as those of Phenician remains in the Mediterranean islands and Asia Minor. Crucibles and other implements, ingots, specimens of art work in gold, discovered at Zimbabwe, indicate that the place was a Phenician gold mining settlement many centuries before the Christian era. It also seems clear that the cruel, hideous Baal worship of the Phenicians was established there.

From the Phenician age to the Portuguese the history of the country is a blank. But it is certain that Monomotapa was at all times regarded by Eastern nations as a land rich in gold. It is a dubious compliment to the English to call them, as Mr. Wilmot does, the modern Phenicians. Their ancient namesakes were as cruel a people as any known in history. The old Phenicians were great colonizers and explorers, they were the chief traders and carriers of the ancient world and the most adventurous seamen, but there, we hope, ends the resemblance between the English and the traders of Tyre, Sidon and Carthage.

Solomon's Ophir, if such it really was, became one of the fourteen missionary provinces of the sixteenth century Papacy. Under the Dominicans who succeeded the Jesuits in Ophir, the country was named "the province of the rosary." The story of the martyrdom of the Jesuit Father Silveira, in 1561, as related by Mr. Wilmot bears in some respects a striking likness to the Platonic description of Socrates' death. The volume contains some illustrations of Phenician remains and a copy of a fine map in the Vatican library. In this map, first published in 1623, Monomotapa is well filled up, probably from details supplied by the Roman missionaries.

The Prevalence of Sleeplessness.

It is probable that most medical men, whose work lies largely among those who toil with their brains, have noticed the unusual prevalence of sleeplessness during the past winter, and more especially among men. Patient after patient repeats the same story. He goes to bed at his usual hour, falls off to sleep very much as usual, but, instead of sleeping through the whole night until six or seven in the morning, he wakes about three, or even earlier, and, do what he will, he can get "no sound sleep after that time." He may lie more or less still, and may even "doze off" occasionally; but if he does, he dreams or is more than half conscious, and in the morning when it is time to rise he feels not only unrefreshed, but as if he would give all his day's profits for one single hour of sound, refreshing sleep. But that may not be. Now, there are three things to be said on this point—first, something as to the cause; secondly, as to the treatment to be avoided; and thirdly, as to the treatment which will probably cure. The cause is, no doubt, the absence of clear, bright, frosty weather, and the prevalence of a damp, relaxing atmosphere of relatively high temperature for the season. That this is the true cause is practically proved by the improved sleep which most patients obtained during the sharp frosty nights of the past winter. Under the circumstances what is to be done? One thing must certainly not be done—soporifics must not be resorted to. The right thing to do is, if possible, to diminish, or altogether stop, excessive brain activity. The most effectual step toward this end is to run away to the seaside for a few days or a week, and to a cold, bracing place. To take sleep-producing remedies may answer the purpose for a short time; but such a course cannot but be attended with after injury under the peculiar physiological conditions. A few days of brain rest and brain bracing at the seaside will, with certainty, effect a "natural" cure in most cases, and the effect upon the whole system will be as lasting as it will be beneficial.—Hospital.

A Bear that Lives in Water.

Next time you have a chance, recommends the Chicago Record, put some water from the edge of a standing pond under a high power microscope, and perhaps you will see that most interesting little organism known as the water bear. It is a diminutive animal, often found in drinking water, and looks very much like a bear. The extraordinary thing, however, about this tiny creature is that he is found in the gutters of houses, where he is at one time dry as dust and scorched by the blazing sun, at another active and full of life under a refreshing shower of rain. The water bear has the scientific name of tardigrada, because he takes life so easy. He is always fat and plump, and spends his waking periods in constantly grubbing with his four pairs of legs among whatever rubbish comes in his way. Having eyes, brain and a nervous system, he is much ahead of most of his tribe, and he is altogether one of the most interesting and amusing little animals known to science.

Science Notes.

By means of the apparatus employed for collecting air at great heights in the ascent of the Aerophile on February 18, 1897, the following analysis of the air collected was made: In 100 vols. of air deprived of carbonic acid and taken at the height of 15,500 meters, there was found oxygen, 20·79 vols.; nitrogen, 78·27 vols.; argon, 0·94 vols. The ratio of argon to the total of nitrogen plus argon equals 0·01185.

Chemists understand that the laboratory at Cornell has the investigation of the "rare earths" quite to itself in America. Yet it is doubtful if it is anywhere known what a mass of these costly elements has been accumulated at that institution. A recent inventory disclosed that of didymium, which sells for $7 an ounce, Cornell has 300 ounces; of cerium, quoted at $6 an ounce, 400 ounces; of lanthanum, worth $35 an ounce, 30 ounces; and considerable quantities of yet rarer "rare earths" which cannot be obtained upon the market at all. Prof. Dennis, of Cornell, has made a life study of these elements, and has notably added to scientific knowledge in this field.

Prof. Harris, of Cornell University, is having built a naphtha launch which he will use in a summer course in the study of the fossil rocks of New York State and elsewhere. Science teachers in the schools of the State may take this course with no more expense than would attend a summer residence at Ithaca. Two trips will be taken this year, one down to Chesapeake Bay and its tributaries, and later in the summer a trip from Troy to Ithaca, in the course of which a complete view of the successive formations of the State will be had, beginning with the lowest paleozoic formations and coming steadily upward, collecting, sketching, and photographing each terrane. The launch is built so as to be of very light draught, for running up into shallow creeks. This will furnish an ideal way of passing the summer for those who wish to visit all parts of New York State at slight expense, live in the open air, and learn something.

The second volume of the Annales of the Meteorological Observatory of Mont Blanc contains papers on a greater variety of subjects than might be inferred from its title. The director, M. Joseph Vallot, contributes a record of observations made simultaneously at three stations—Mont Blanc, Grands Mulets, and Chamonix—during 1890, 1891, and 1892, and also, in a separate paper, describes the difficulties of making scientific observations at great altitudes. There are several memoirs on actinometry and one on the geological constitution of Mont Blanc. Of special interest to engineers is the description of the application of photography to the survey of the Mont Blanc group, and the account of the progress of the map of this region. The volume contains some interesting illustrations, and the views of the "Cuisine de l'Observatoire," and of the cozy "Chambre du Directeur," seem to show that home comforts are not entirely wanting even on the summit of the Alps. A third volume is announced to appear shortly, and a fourth is in preparation.

The Lowell Observatory, which was transferred from Flagstaff, Ariz., to Mexico early in December last for the purpose of observing the opposition of Mars and for the measurements of southern double stars, has been dismounted and shipped back to its original location, after three months' remarkable service. Dr. Lee, who was in charge of the observatory in the southern heavens, announces that since January 1 more than three hundred thousand double and triple stars had been measured. More than half were new, having never been reported by any astronomer. The report will be the largest and most important addition to the southern stellar astronomy since the observations of Sir John Herschel. Full reports of the work are to be forwarded soon to the Royal Astronomical Society at London. Among his discoveries are many brilliant stars, and perhaps fifty difficult stars separated by less than one second of an arc. In addition to these discoveries, his corroborative points of argument as to the formation of heavenly bodies will be exceptionally interesting.

Another Arctic expedition is being planned by Robert E. Peary, C.E., U.S.N., according to the representations made to induce the navy department to rescind the late order detailing Mr. Peary to duty at the Mare Island yard, California. Mr. Peary's plan, as now given out, is to purchase and load a ship with concentrated provisions; to proceed to Whale Sound and with the assistance of Eskimos land the stores at Sherard Osborne Fjord, or further north, if possible. The ship is then to be sent home, and as soon as the fjords freeze over sufficiently to permit sledge travel, the supplies would be advanced and cached in a line toward the pole. He would expect, in the following spring, to find his small party and the bulk of the provisions at the northern terminus of the North Greenland archipelago, probably near the eighty-fifth parallel, with a line of food caches extending to the starting point. From this point, and as the weather permitted, he would make a dash for the pole, with two of the best Eskimos, picked dogs, and the lightest possible equipment. No definite time of departure is fixed, as all the preliminary arrangements are not yet completed. But Mr. Peary expects to visit Greenland this summer, and there organize a force of Eskimos for the intended expedition and otherwise make preparations. He will also endeavor to bring back the one hundred ton meteorite found by him in Greenland.

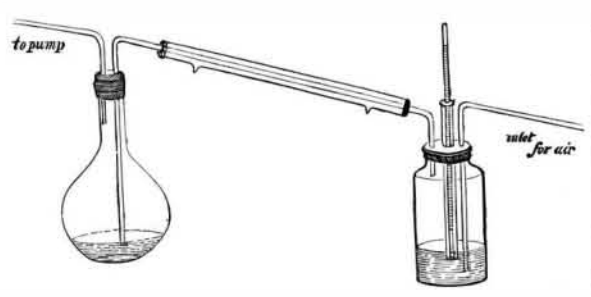
A SIMPLE METHOD FOR OBTAINING A LOW TEMPERATURE.*

BY C. EDWARD SAGE, F.C.S.

Having frequent necessity to observe the behavior of oils and fatty acids at a low temperature, I have been led to construct a simple piece of apparatus, which enables one to reduce the temperature of a sample in a very short space of time.

I venture to bring it before your notice, because I believe its use to be capable of extension to many purposes, and a short description will suffice to explain its construction.

A 6 ounce, wide mouthed flask or bottle is fitted with a good cork, which is to be pierced with three holes, one of which is to be large enough to admit a test tube, the other two are for the admission of two glass tubes. The inlet tube passes to the bottom of the flask, and the exit one passes only a short distance through the cork. The flask is partially filled with ether, and the sample to be examined is placed in the test tube together with a thermometer. Air is now forced into the flask by the inlet tube and made to bubble through the ether, whereby it exposes a large surface for evaporation, and, as this takes place very rapidly, the latent heat absorbed soon reduces the temperature of the sample. Instead of forcing air through the inlet tube, the exit may be attached to a Sprengel pump and the air sucked through. To prevent the waste of ether as far as possible, it is preferable to attach the exit tube to a condenser through which water is running, and to wash the air sucked through by means of cold water in a wash bottle; this water will, on subsequent warming,



yield a small quantity of ether, but the larger proportion is kept back by the condenser.

I have had several of these freezing bottles in use during the past summer, and found no difficulty in maintaining a temperature of —4° to —5° C. for a long period, even during the hottest weather, and if the test tubes were filled with water, it was converted into ice in a few minutes, with the expenditure of very little ether.

Opening of the Tennessee Exposition.

The Tennessee Centennial Exposition was opened at noon, May 1, with appropriate ceremonies, in the presence of many thousands of people. The weather was bright and clear and the parade was a great success, the public buildings and business houses and residences being handsomely decorated. The opening ceremonies were simple but impressive, and made a fitting tribute to one of the most memorable events in Tennessee's history. The ceremonies were opened with prayer by the Rt. Rev. T. H. Gailor, Coadjutor Bishop of Tennessee.

After "America" had been played, Major J. W. Thomas, president of the Tennessee Exposition Company, made an appropriate address, in which he reviewed the history of the undertaking and the hopes they had for the future. Addresses then followed by Gen. Taylor and Major E. C. Lewis. President Thomas then telegraphed to President McKinley that the Exposition was ready for him to open. President McKinley touched the button which started the machinery, and as the band played "Hail Columbia" the Tennessee Centennial Exposition was opened to the world.

GEN. HERMAN HAUPT, the well known civil engineer, recently celebrated his eightieth birthday at his home in Philadelphia. He is a graduate of West Point. He was the chief engineer of the Pennsylvania Railroad during its construction, and constructed the famous Hoosac Tunnel line in Massachusetts. During the rebellion President Lincoln placed him in charge of the military railroad bureau, rewarding him with several commissions. The first pipe line for transporting oil across the State of Pennsylvania was constructed by him, and he was instrumental in locating the Piedmont Air Line in the South and the Northern Pacific Railroad in the West. The application of compressed air to traffic has been largely developed by him, and he has been a prolific writer on scientific subjects.

* Read before the Chemists' Assistants' Association (London) and taken from the Pharmaceutical Journal.

Correspondence.

The Water Moccasin.

To the Editor of the SCIENTIFIC AMERICAN:

In the SCIENTIFIC AMERICAN of March 27 is an article on "Snakes," from the pen of Mr. L. P. Gratacap, in which he speaks of a visit to the American Museum of Natural History, and says he was shown specimens of the water moccasin, whose bite is almost as venomous as that of the rattlesnake. He further states that Mr. R. L. Dittmars, who showed him the snakes, had been engaged in collecting samples of their venom to be sent to the laboratory of Heidelberg for analysis.

Now, with all due deference to the opinion of Mr. Gratacap and Mr. Dittmars, I would state most positively that the water moccasin, which lives in the alluvial districts of Mississippi and Louisiana, and, in fact, throughout the Mississippi Valley, is not a venomous snake, as it possesses neither fangs nor poison sacs.

I have for some time past had a standing reward of one hundred dollars offered to any one who will bring me a poisonous water moccasin, and, although the number of all other kinds of snakes in this section of country put together would not equal that of the water moccasin, yet no one has claimed the reward, from the very simple fact that there is no such snake as a poisonous water moccasin in the Mississippi Valley.

What is known in the South as the dry land or cotton mouth moccasin is a very poisonous snake, and its bite is about as venomous as that of the rattlesnake. It is, however, not a water snake, although it is often found on the banks of small streams and rivulets in search of prey. The shape of its head, body and tail, as well as its color, ought to enable even a careless observer to distinguish it from the water moccasin.

I have been prompted to write the above article from the fact that Mr. Gratacap's essay was published in the SCIENTIFIC AMERICAN, and I fear many thoughtless persons will quote it as having been indorsed by that standard authority. F. W. COLEMAN, M.D.

Rodney, Miss.

To the Editor of the SCIENTIFIC AMERICAN:

In reference to Dr. Coleman's interesting protest as to my statements in your journal, I beg to say that the statement is correct, and that only the limitations of popular terminology would have led to any expression of dissent from your correspondent.

The snake I designated is commonly known as water moccasin, though also called cotton mouth, and when the necessities of intelligible conversation intervene, it is among collectors in this city and elsewhere alluded to by the former title, viz., water moccasin. To be, however, incontrovertible, the scientific name of Ancistrodon piscivorus Lacépède will establish its identity. Holbrook calls it "water moccasin."

Now in reference to its habits. Holbrook observes, "It is found about damp, swampy places, or in water—far from which it is never observed. In summer numbers of these serpents are seen resting on the low branches of such trees as overhang the water, into which they plunge on the slightest alarm." As to their affinity for water, no one who has kept them in confinement can entertain any doubt.

Of course the poisonous character of Ancistrodon piscivorus, L., is as well known to Dr. Coleman as to all ophidian students. If the customary uses of language in Dr. Coleman's vicinity limit 'cotton mouth" as the common name of this snake, certainly a wider habit of speech has very convincingly named it "water moccasin."

One word in conclusion. In nature the food of this snake is "such fish as he can overtake, and few exceed his velocity in swimming."—Holbrook.

I trust Dr. Coleman will exonerate me from any serious misstatements, such as he charges. I do not think I could have been misunderstood by herpetologists generally. Thanking you for the opportunity of this reply, I am, yours faithfully, L. P. GRATACAP.

New York City.

Novel Patent to Curb the Use of Tobacco.

A time lock for tobacco boxes, recently patented by Grant W. Smith, of O'Neill, Nebraska, is designed to control the supply of chewing or smoking tobacco carried by the user of the weed, and enable one who so desires to limit himself in its use. The tobacco box, according to this improvement, has one compartment for the tobacco and another in which is a clock gearing with time indicating and time controlling notched dial adapted to engage or release a latch hook by which the lid of the compartment containing the tobacco is closed. The victim of the tobacco habit may regulate the mechanism so that he can have access to the tobacco in the box at stated times only, and thus, in the words of the inventor, "control his appetite therefor and resist inclination to its inordinate use;" so that, "by gradually increasing the length of time between such acts of indulgence, the habit of tobacco chewing and smoking may be greatly restricted, and cured in course of time, as its effect on the system is gradually diminished."