SERPOLLET'S STEAM CARRIAGE.

Mr. Serpollet's inexplosive generator was described by us at the time that it was presented to engineers and the public. As well known, it consists of a capillary metallic tube, in which water, when injected into it, is immediately converted into steam. This remarkable generator, which contains but a few cubic centimeters of water and no steam in reserve, seemed to us at the very outset admirably adapted for satisfying certain exigences, and especially those of the economical and practical propulsion of vehicles. After first operating a steam tricycle, Mr. Serpollet has within the last two years successively constructed experimental vehicles that have many times been operated at Paris, and that in January, 1889, permitted him, in company with Mr. Ernest Archdeacon, to make a long trip to Lyons. These preliminary studies led the inventor to devise an absolutely practical type that we propose to make known to our readers.

As shown in Fig. 1, the new carriage is handsome and luxurious. The work, moreover, was done by one of our best specialists. It has the form of a large phaeton, and is capable of seating seven passengers—three upon each seat and one upon a bracket seat opposite. Nothing of the comfort found in ordinary carriages is lacking in this. The suspension is easy and the seats are soft. In case of rain the hood in front can be put up, as in other phaetons.

The generator is concealed from view. It is situated in the rear between the two coal boxes, with which it is connected by two passageways, through which the fuel is fed automatically. The chimney is inverted. Another chimney, used only for firing up, is carried in a box. The water tank is placed under the seat to the left. The supply of water permits of making a trip of 30 kilometers, and the supply of fuel permits of a run of 60 kilometers. In cities the fuel to be preferred is coke, on account of the absence of smoke. The total weight of the carriage, charged with water and fuel, is 1,250 kilogrammes. It carries then 70 kilogrammes of fuel and 90 of water. The mean vaporization of the generator is 80 kilogrammes per hour. The consumption per horse and per hour does not exceed 14 kilogrammes.

The engine has two cylinders, the cranks are keyed at right angles, and the admission of steam is made at 65 per cent. The power, which is that of four horses, may momentarily attain that of six. The arrangement of the transmission is such that two speeds may be employed, one for gradients and the other for running on a level. With the latter, a speed of 25 kilometers per hour is obtained and maintained practically upon a good road. This speed it would be imprudent to exceed, or even at times to maintain. With the other speed, the carriage loaded with its seven passengers has ascended gradients of 8 centimeters per meter over heavy roads charged with pebbles.

Firing up is effected as in ordinary stoves, and in twenty minutes everything may be put in a state for a trip. The starting is effected by means of a hand pump. The water introduced into the generator instantly vaporizes, and the carriage begins to move. The feeding continues automatically. The steering handle serves also to regulate the speed. It is capable of making a rotary motion upon its axis and of opening and closing an orifice for the return of the water to the tank. It requires but one hand for the steering. As with stationary generators, stoppage is effected by cutting off the feed. The most sudden stoppage is effected through a brake with a pedal placed within reach of the driver's foot. No inspection apparatus is necessary, and it is, therefore, possible (as experience has demonstrated) to travel during the darkest night with a simple lamp for lighting the roadway.

The carriage is provided with a pressure gauge, which, without being necessary, gives some very interesting readings. It renders evident one of the great merits of the Serpollet generator, and that is its capability of reaching high pressures instantaneously and without danger.

If, on throwing the carriage into gear, it is in a tight place and a pressure of 10 atmospheres does not suffice to set it running, the injection is continued up to 15, 18, or 20 atmospheres if need be, and this rise of temperature takes place spontaneously at the very moment that it is necessary, and that, too, without danger. The Serpollet generators are tested to 100 atmospheres and are registered at 94. They are tested to 300 at the works before the test of the administration of mines.

There is another interesting point to be mentioned: According as the carriage is running on a level or up or down hill, the pressure, without one's having to occupy himself with the apparatus, remains stationary or descends or rises of itself, according as the motor meets with a greater or less resistance. The peculiarities of the Serpollet generator explain the facility with which a new effort may be given to the motor of the carriage in difficult passages, either for avoiding an impediment or for traversing a bad road. A simple supplementary injection with the hand pump suffices to obtain the desired effect. The pressure rises, the quantity of steam produced increases, and the new stress is exerted as if by a horse. No inspection is necessary on stopping, and no obstruction occurs in the generator, whatever be the quality of the water supplied to it.

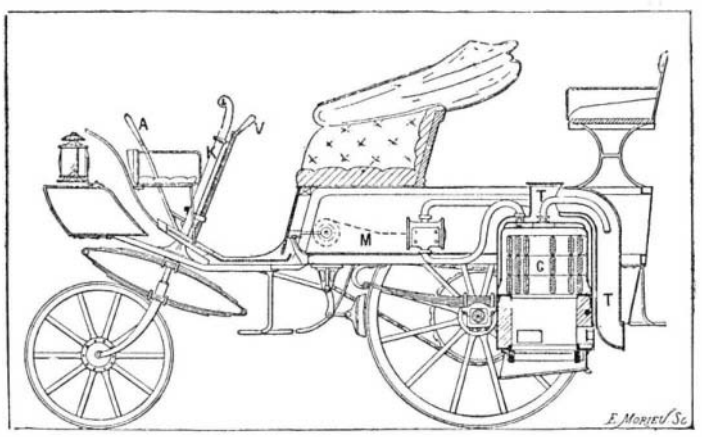

Fig. 2.—SECTION OF THE VEHICLE.

A. Starting lever. M. Two-cylinder engine. G. Inexplosive generator. T. Smoke pipe. V. Handle for change of speed. K. Steering handle.

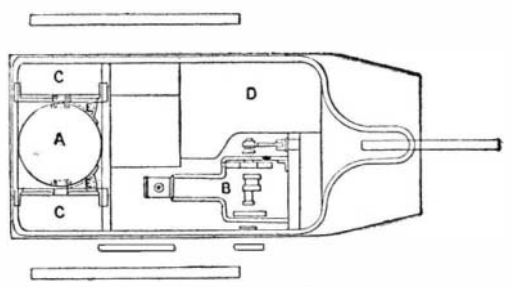

Fig. 3.—PLAN OF THE VEHICLE.

A. Generator. B. Motor. C C. Coal boxes. D. Water tank. E. Fuel feeders.

Mr. Serpollet's steam carriages have been authorized by the prefecture of police to be run freely in Paris, with a single restriction, and that is, they must not exceed a speed of 16 kilometers per hour.

Mr. Serpollet was kind enough recently to offer us a seat in his first steam carriage. After taking us to the Bois, he brought us back to Paris through the Champs Elysees and the great boulevards, running his vehicle amid carriages and crowds with remarkable precision.

It seems to us that a great progress is here realized and an important problem solved.—*La Nature.*

Fig. 1.—SERPOLLET'S STEAM PHAETON.

Humming Bird Notes.

These little sun beams of birds, as the Western Indians called them, are only found in North and South America and the islands adjacent. They are more thickly distributed in the equatorial section, and are there known as "sun birds." The peculiar and often beautiful formation, and the iridescent coloration of their plumage, are characteristics that excite the wonder and admiration of all observers, naturalists and laymen. The long-tailed humming bird of Jamaica (*Trochilus polytmus*) is more transcendent in beauty of form and color than the celebrated emerald paradise bird of New Guinea.

Some species range north to the Arctic regions and south to Patagonia, and from the level of the sea to the cold heights of the Andes, but, wherever found, the hues of emerald and ruby, and amethyst and topaz, flash from their beautiful forms. Everything in their organization contributes to give them great power and rapidity of flight, and they are able to balance themselves in the air or beside a flower with a facility which finds a parallel only among some of the insects. The bill is awl-shaped, thin, sharp-pointed, straight or curved. The tongue, which is split almost to its base, forming two hollow threads, can be protruded at will, and, while their main food is assuredly the distilled juice of flowers, they will not live when deprived entirely of insect food.

There are about 400 species of humming birds, but only six or seven are native to the United States. Among the most prominent species, esteemed for the singular formation and color of their plumage, we find, first, the "long-tailed" humming bird, which is found only in Jamaica. The upper part of this beautiful creature is of a green color, glossed with gold; the wings are purple brown, and the tail, nearly three times longer than the body, is black, with a steel-blue reflection. Its length, including the tail, is about ten inches. Another remarkable species, not especially brilliant in plumage, is the "sword-bill," with a beak nearly as long as the rest of its body. The copper-bellied, puff-leg humming birds have a tuft of pure white, downy feathers, which envelop each leg, hence its name. The "white-booted racket-tail" is another brilliant, and is noted for its remarkable swiftness of flight, darting like an arrow through the air. Many other species are deeply interesting, and their names also will suggest the brilliancy of their coloration. We name a few: Little flame-bearer, Princess Helena's coquette, the snow-cap, spangled coquette, the ruby, topaz, blue-tailed sylph, Cayenne fairy, and many others with characteristic names and beauty.

While in their daring flight some of the wading birds cleave their way through the clouds and sweep a whole hemisphere, a little family of humming birds have only a rose bush for their universe. Like an elegant vase ornamented with lichens, a downy nest of cotton is balanced on the extremity of the most slender branch of the plant, while these aerial diamonds make prey of the insects which the flowers attract, or drink the pearls of dew which their petals distill. Such, Pouchet tells us, is the life of the sparkling-tailed humming bird. In the same manner, according to Gould, the "emeralds of Brazil," as they are commonly called, robed in changing green, set up their family nests upon the slender, pendent stems of the creepers, from the vicinity of which they never move. Rocked by the zephyr, the female broods tranquilly on her eggs, while her lord flits amorously near her; here are spent all the happy days of the gentle pair. —*Nature's Realm.*

Earthquake Photography.

We learn from the *Revista Scientifico Industriale* that Signor Baratta's device is briefly this: The telephone wire is connected with a subterranean microphone. Before the telephone diaphragm (vertical), and connected with its center by a fine aluminum wire, is a short slip of the same metal, fixed below, and having a curved piece at the top, which rests against a small mirror, movable about a horizontal axis. This mirror reflects the light from a lamp and lens to photographic paper on a rotated drum. The light is momentarily shut off every quarter of an hour by a shutter arrangement, worked electro-magnetically by the clockwork which moves the drum.

Astronomical Expedition to Peru.

Professor William H. Pickering sailed from New York for Arequipa, Peru, on December 20, accompanied by Mr. A. E. Douglas and Mr. R. D. Vickers, who will assist him in his astronomical work. The Harvard College Observatory has, until recently, occupied a station on Mount Harvard, near Chosica, in Peru, where, under the direction of the Messrs. Bailey, photographs of the southern heavens have been obtained with the Bache photographic telescope, aperture 8 inches, focal length 44 inches. Measures of the light of the bright and faint stars have also been made with the meridian photometer. These measures will furnish the material for determining the magnitudes of the southern stars brighter than the magnitude 6·3, and thus extending the "Harvard Photometry" to the south pole. Measures have also been obtained of stars of the ninth magnitude and brighter, distributed in zones similar to those recently published in Vol. XXIV. of the H. C. O. Annals. In consequence of the long duration of the rainy season at Mount Harvard, the instruments have been removed to Arequipa, which has an elevation of about 8,000 feet above the sea level, where a station has been established. There, under the direction of Professor W. H. Pickering, the photometric observations will be completed and the work of the Bache telescope continued and extended. The plan of work for this instrument is to cover the sky from —20° to the south pole, first with chart plates having 10 minutes' exposure, second with chart plates having 60 minutes' exposure, third with spectrum plates having 10 minutes' exposure, and fourth with spectrum plates having 60 minutes' exposure. Each of these researches will cover the sky twice, so that at least eight photographs of every bright star will be obtained.

It is further proposed that, while the instrument remains in Peru, the first of this series of plates be repeated each year, in order to furnish a means of determining and discussing the variability of large proper motion in the stars. Professor Pickering has taken with him the Boyden photographic telescope, aperture 13 inches, which, until lately, has been employed in photographing the objects of interest in the heavens which could be advantageously obtained at the station on Wilson's peak in southern California. With this instrument he will continue to photograph the moon, planets, double stars, clusters, and nebulæ. In addition to this, by placing a prism over the object glass, the spectra of the brighter southern stars will be obtained with this instrument, on a scale which will render the photographs comparable with those of the northern stars obtained with the 11 inch Draper telescope at Cambridge, thus extending this important investigation also from pole to pole. A meteorological station will be attached to the observatory at Arequipa, which will furnish interesting records of atmospheric conditions prevailing at this elevation. The series of meteorological observations at Viconcaya, elevation 14,600 feet, at Puno, elevation 12,500 feet, and at Mollendo, near the sea level, will also be continued. The Messrs. Bailey, who at present have charge of the observing station at Arequipa, will probably return to Cambridge in April, bringing with them the meridian photometer.—*Sidereal Messenger.*

The Del Norte Well.

It is an artesian well with an abundant flow of pure water, sufficient to irrigate a considerable body of land. That would be enough for any one but a San Luis man, but this is mineral water. It is effervescent, very palatable and extremely healthful. Nor is this all; the force of the water brings up from the depths an occasional lump of native silver or a gold nugget. The frugal farmer has placed a sack of wire netting over the mouth of the well to catch the metal and prevent it from choking the cows. Local scientists claim that at a great distance down and under an enormous pressure the water is washing away a ledge of rock whose softer parts go into solution and give the water its mineral qualities, but whose gold and silver, not being dissolved, are brought to the surface in a metallic state.—*Pike's Peak Herald.*

Polychromine.

Polychromine is the name given to primuline by a Swiss manufacturer. He has found that the diazo compound of this body is but slowly decomposed by boiling with acids, and the product has no technical value, but that when boiled with alkalies it is quickly altered and a product is formed which has some technical value. The reaction is carried out as follows: 50 lb. of polychromine are dissolved in 100 gal. of water, mixed with 30 lb. hydrochloric acid 30° Tw., and diazotized by adding 7 lb. nitrate of soda; then 30 lb. ammonia at 25 Be. are added; the mixture is allowed to stand for about twelve hours, after which it is boiled, when the new coloring matter forms. It is separated out in the usual way. It dyes unmordanted cotton a gold yellow, which is turned red by caustic alkalies; like the original color, it can be diazotized on the fiber to form new shades.

Soda Lake.

A brief description of the interesting region of San Bernardino County, Cal., cannot fail to be of interest. There is a tradition among the Piute Indians to the effect that during the time of their forefathers what is now Soda Lake was at that time a vast sheet of water 20 miles long and 8 wide, which must have been fresh, as the legend says the waters teemed with fish. It is situated 500 feet above the level of the sea. There are times when this great natural reservoir is filled to the brim, particularly when heavy cloudbursts occur on the slopes of the neighboring mountains, and the waters rush in torrents down into the basin. Then the subterranean channel or outlet is flushed and found too small to carry off the flood. So great is the pressure that the lake bed becomes a veritable geyser, spouting mud and water violently.

On the southwest side of the lake is a considerable area covered by sand dunes, which region has been named in grim humor the Devil's Playground or Hell's Half Acre. During the wind storms which frequent this section, millions of tons of sand are shifted in a great circle about 12 miles in diameter from one side of the lake to the other, the central portion of the area remaining seemingly undisturbed, covered by a snowy white crystallization of soda.

Along the west side of the lake for a distance of four miles occur springs of pure water which flow down to the lake's margin, where the greedy sands swallow up the streams. The largest spring flows from a fissure in the solid blue limestone which forms the bedrock of the region. The water from this spring flows about 18 miles before it is lost in the desert sand. There are numerous other springs on the southeast side of the lake.

Soda Lake station is situated about 75 miles east of Daggett on the line of the old emigrant road from Salt Lake. Its mean temperature is about 80 degrees. To the northward, a deep, rugged canyon has been cut down into the limestone. Passing through this canyon we come to another dry basin, known as Crystal Lake. In size its area is 60 miles, 12 long by 5 wide. This basin is filled at times, though rarely, by the overflow from the Mojave River.

Making our way through another pass for a distance of 12 miles, we reach the confluence of the Mojave and Amargosa rivers, where a spur of the Ivanatz Mountains forms one of the river banks. On the westerly slope of this range occur the salt spring and Amargosa mine, which were discovered by John A. Golden in 1849, while on his way from St. Louis, Mo., with an emigrant train. It was this same train which divided at King's Springs in Nevada. It was from this circumstance that the sensational stories arose which have recently been published giving lengthy descriptions of the terrible sufferings and ultimate death of a hundred or more men, women and children in Death Valley while endeavoring to cross the desert. The loss of life, though not near so great as reported, occurred with that portion of the train which Mr. Golden left. After leaving the main train in Nevada, he started with his own outfit for Los Angeles, California. Traveling down the Amargosa River, he camped one day at Salt Spring, and it was while here that he made his way up the mountain side and found a piece of heavy black mineral.

Not being familiar with it, but thinking it might possibly have value, he took it with him to camp, eventually taking it to Los Angeles, where he showed it to a number of gentlemen, who at once unhesitatingly pronounced it gold, covered with a black oxide of iron. He was offered $5,000 to guide a party to his discovery, to which he consented, though it was with the distinct understanding that should he fail to show them his treasure trove, or in the event of his becoming lost on the desert, his life should pay the forfeit. Mr. Golden readily consented, for he had every confidence in being able to guide his party directly to the spot.

A party was promptly formed and left Los Angeles to face the dangers of a reported unknown and terrible desert in search of the golden treasure. The hardy pioneer had no difficulty in finding Salt Springs, and went into camp at that place in high spirits; but his satisfaction at having reached his journey's end was soon turned to consternation when he was unable to find the place at which he had discovered the gold. He tried to keep the dreadful fact from his companions for a time, but they were after gold, and soon became so importunate that he was obliged to confess his inability to find the place again, though the while earnestly protesting his good faith. His copartners felt themselves duped, and angrily recalled the unfortunate man to the terms of the contract, coolly informing him that if he had any prayers to say it was time to commence.

In an agony of despair, though believing the place must be near, he sank on the ground and buried his face in his hands. One of the party approached and stood glaring at him, when casually glancing on the ground at the doomed man's feet, he saw a piece of mineral similar to that exhibited by Mr. Golden in Los Angeles. The mine was located, the party then returning to Los Angeles, where Mr. Golden was paid his $5,000. A corporation known as the Salt Springs Mining Company was formed, and in 1852 a five-stamp mill was erected and kept in operation continuously during the following winter seasons until January, 1864, at which time the Piute Indians, who were on the warpath, massacred every one at the mine, burned the mill and sacked the camp.

After the burning of the mill, Mexicans secured leases on the property and worked the ore in arastras, realizing, it is said, fabulous sums.

Undoubtedly the mine was of a pockety character, as it was afterward abandoned for years and relocated a number of times. In 1880, under the management of C. A. Luckhardt, of San Francisco, the concern was reorganized and listed on the New York Stock Exchange, where the stock sold as high as $15 a share. But little work of development was done at the mine and the entire scheme soon fell through, the mine finally becoming the property of J. B. Osborne, of Daggett, the present owner.

The water of Salt Springs contains about the same percentage of chloride of sodium as that of the sea. The altitude is about 800 feet above sea level, and it is situated about 60 miles directly northeast of Daggett. At 1 P. M. May 2, 1890, the temperature was 88° in the shade.

The many stories of fabulous discoveries in the desert regions are to a great extent apocryphal, and have no foundation in fact. Every mining district has its lost cabin; the desert region its Breyfogle, Lee, Gunsight, Pegleg, and other fakes, on the rediscovery of which both life and money to a considerable amount have been lost without any good results.

My authority for the above version of the golden discovery and ultimate result is Mr. M. Marsh, one of the earliest pioneers of our State and county, and an inhabitant of the desert region for many years.—*Mining and Scientific Press.*

Cannon Ball Photography.

In our number for January 17 we published an engraving of what purported to be a photograph of a shell in flight as fired from an 8 inch mortar, taken on the grounds of the Michigan Military Academy, Orchard Lake, Mich. The photograph was sent to us by J. Sumner Rogers, colonel and superintendent of the academy, who stated it was an instantaneous photograph taken during practice firing under the command of Lieut. Frederick S. Strong, U. S. A.

Thereafter we received the following:

To the Editor of the Scientific American:

I notice in your issue of Jan. 17, 1891, a photomechanical print from an original negative of a cannon ball in motion. If I remember correctly, the experimenters in Hungary, in investigating projectiles in motion, used a shutter speed of 0·0000076 of a second, and then found the ball had moved visibly during the exposure. Now I wish to state that at any time of day when a shadow as long as that cast by the figure in the foreground of this picture occurs, and with a lens stopped down enough to give a sharp outline of the distant woods and also of the adjacent officer, and a shutter speed sufficient to get the ball at all, such a fully exposed and graded photograph is an impossibility; in fact, I should say that anything more than the faintest outline of the highest lights could never be developed.

HENRY N. POTTER,
Photographic Instructor Natural Science Camp,
Canandaigua Lake, N. Y.

Amherst, Mass., January, 1891.

We submitted the above letter to Col. Rogers, who in reply informs us he believed the picture to be genuine, but now finds he foolishly allowed himself to be deceived by a dishonest photographer, who "intensified" the ball so as to make it show in the picture. The Colonel regrets, etc.

Preserving Timber for Piles.

Mr. E. A. Wallberg, in an article on the preservation of timber in the *Transit*, is authority for the statement that whatever preservative is to be applied, the timber for piles subjected to the action of sea worms should first be charred, so as to kill any germs near the surface, open the pores of the wood for the antiseptic, and destroy the nutritive upon which the worm lives while beginning its action. The perfectly sound condition of the piles in the Charleston wharves after seven years of exposure proves the efficacy of this process, since untreated piles in those waters are eaten entirely through in less than two years. The Nicaragua Canal Construction Company also has given orders to char all the piles to be used in the Greytown harbor work.

SOME nickel-steel plates recently tested at the Carnegie works, the specimens being cut from a three-fourths inch plate, gave excellent results. The elastic limit is said to have been 59,000 to 60,000 pounds, and the ultimate strength 100,000 and 102,000 pounds. The reduction of area was 29⅛ per cent and 26½ per cent respectively.

Concerning Memory.

History furnishes us with a largenumberof examples of wonderful memory.

Scaliger, an Italian, in twenty-one days committed to memory the Iliad, which comprises 15,210 verses, and the Odyssey, which also comprises a large number; Lipsius, a professor at the University of Leyden, offered to recite Tacitus' history in its entirety in the presence of a person armed with a poignard, who should stab him with it at the first error; Louis XIII., after a year's time, could draw, from memory, the plan of a country with all its details; and the actor Lassaussiclere, after reading advertising sheets for an hour, could repeat them textually, and this, it may be said, by way of parenthesis, must have been pretty wearisome. It is stated also that an Englishman who had an extraordinary memory was introduced to Frederick at Potsdam, and on the same day Voltaire having brought some verses to the king, the latter had the Englishman concealed and requested Voltaire to read his work. "But these verses are not yours," said the king, "they were recited to me this morning." He then produced the Englishman, who, to the great astonishment of Voltaire, recited them without error.

It is especially in the legendary stories of antiquity that we find numerous examples of extraordinary memory. Let us recall the fact that to Adrian the successor of Trajan, to Mithridates, to Themistocles, to Scipio, to Cyrus, and to many others, is attributed the faculty of remembering the names of all their soldiers; that it is claimed that Hortensius the orator attended a public sale lasting a whole day and recalled, in order, all the objects sold and the names of the purchasers; and that the ambassador Cineas, having been received in the senate, saluted by name, on the following day, all the senators, whom he had seen but once. These numerous examples from antiquity are easily explained. In fact, before the dissemination of the art of writing, the development of the memory was indispensable. In our day, this faculty is less cultivated, at least for ordinary requirements, since, by means of notes, we can almost dispense with it. Yet there is a memory that every one possesses and that many persons are ignorant of, and that is the memory of the eye, the memory of things seen, that of the artist and the draughtsman—the faculty that permits the latter to reproduce an ornament, for example, that they have seen but once. This memory is possessed by every one in a greater or less state of development, for every one sees, and to a greater or less extent classifies in his brain the things seen, and that too without being conscious of it. It is this memory of the eye that forms an excellent mnemotechnical method. The following are a few examples. Many soldiers, in order to recall theory, endeavor to figure to themselves the page *recto verso* and then the place on the page where the article that they wish to recall is found. Certain prestidigitators employ the same method for indicating in a book the page and line containing a citation that is made to them. Others, after having had repeated to them any forty common names, at once repeat them in order, either by commencing at the beginning or the end, or at random, in assigning to each of them the number of the order in which it has been given. An author of the 16th century named Muret tells that he once saw a Corsican to whom he dictated two thousand Latin, Greek, and barbarous words having no affinity with each other, and who repeated them to him in order. This appears to us doubtful, for it is pretty difficult to memorize and repeat forty words only, and requires a well drilled memory. Yet with the memory of the eye we can quickly reach the same result, not with forty, but with twenty names, for the difficulty increases in proportion to the number of words added. It is necessary to proceed as follows: Let us suppose that the first name given is "mouse;" do not attempt to recall the word, but consider your memory as a sensitized photographic plate—in a word, make a negative of the object, see before your eyes the animal itself walking slowly and carrying a placard marked No. 1. Let us take "hat" for the second name. Imagine a hat with the number 2 fixed above, as upon the hat of a conscript. For No. 3 let us suppose "chair." Imagine a chair provided with a number showing its price as marked by the dealer, etc. You will then easily recall the succession of the objects and the number of their order and will be able to name them in every way possible. Proceed in this manner up to ten, and then the next day up to twelve, and so on, gradually increasing the number. After a few repetitions of this exercise, you will be astonished at the ease with which you will succeed in retaining twenty or more words, absolutely classified in your mind as if on drawing paper, so that when you are asked the number the name will come to your mind, and reciprocally. This is a pleasing diversion for family reunions on long winter evenings.—*M. Alber, prestidigitator, in La Nature.*

A VERY extensive domestic industry in Russia consists of the manufacture of wooden spoons, which are made to the amount of 30,000,000 annually. They are nearly all made of birch.

CENTRIFUGAL ACTION OF AIR.

BY GEO. M. HOPKINS.

That air has sufficient mass to enable it when set in motion to do work is shown by every whirlwind, by

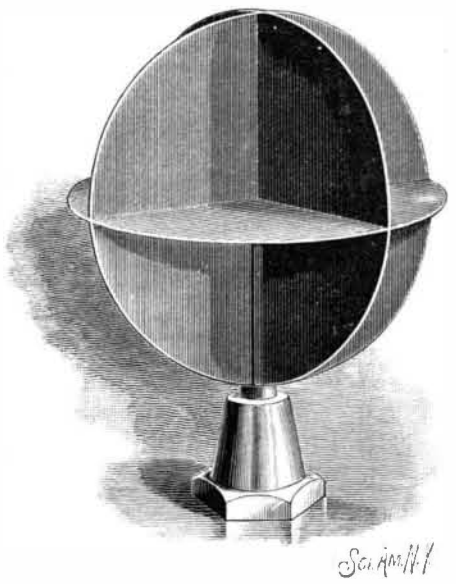

Fig. 1.—THE "SKELETON SPHERE."

the action of the windmill, by the sailing of vessels, and in other ways. The grandest example of the centrifugal action of air is furnished by some of the movements of the entire atmospheric envelope of the earth; the upward currents at and in the vicinity of the equator, the downward movement of the air at the poles, and the winds blowing along the earth's surface from the poles toward the equator are due in part at least to centrifugal force. Any body revolving in air furnishes a partial illustration of this principle, the defect in the illustration being the absence of a force to

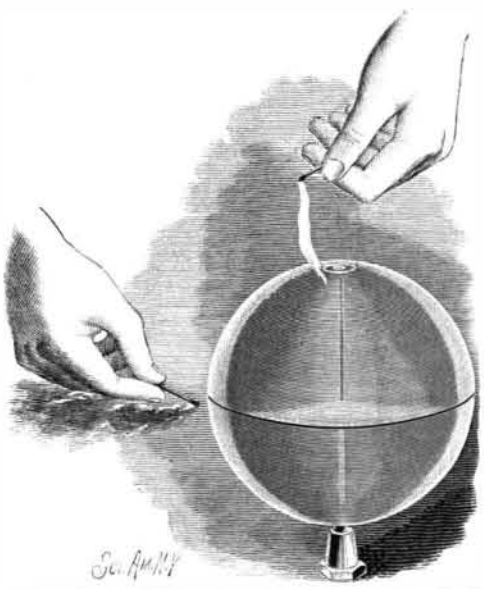

Fig. 2.—AIR CURRENTS SHOWN BY FLAME AND SMOKE.

hold the same body of air always in contact with the revolving body.

A very simple and effective piece of apparatus applied to the whirling table for showing the effect of centrifugal force on air was described some time since in a foreign scientific journal. The writer has applied this apparatus to the scientific top (already described in these columns), in the manner fully illustrated by Fig. 1. The construction of the attachment is shown in Fig. 2, and Fig. 3 shows the direction of the air currents.

The apparatus consists of a metal tube loosely fitted

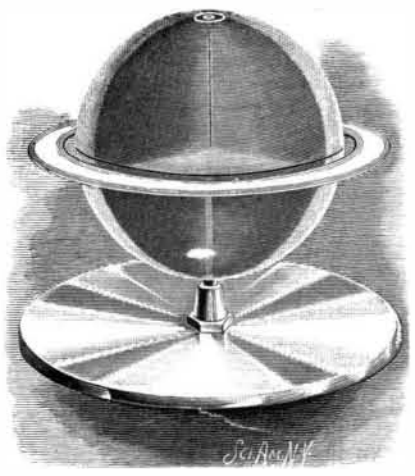

Fig. 3.—PAPER RING SUPPORTED BY AIR.

to the stem of the top and provided at its upper end with a tin disk four inches in diameter, with four quadrants of the same material attached to the disk and tube below the disk and a similar arrangement of quadrants above the disk, thus practically forming a skeleton sphere—if such an expression may be used—of two vertical circular disks intersecting each other at the axis of rotation, these two disks being intersected at the equator by another at right angles to the axis.

The top being in rapid motion, the apparatus is placed upon the stem, and being revolved at the same rate as the top, it throws out air at the equator which is continually replaced by air drawn in at the poles. The direction of the air currents is clearly shown by holding a lighted wax taper near the apparatus at the poles, and at the equator, as shown in Fig. 2, or by creating a smoke in the vicinity of the top.

A paper ring, ½ inch or ¾ inch wide, and ¼ inch larger in internal diameter than the sphere, is supported by the outrushing air, in a plane nearly coinciding with the equator. If displaced and released, it immediately returns to its original position.

Professor W. C. Peckham, of Brooklyn, who has been experimenting with a large sphere of this kind, thinks that the trade winds could be fairly illustrated by the apparatus, provided it could be inclosed, so as to cause the same body of air to circulate continually from pole to equator, and in the reverse direction.

Inoculation by Mosquitoes against Yellow Fever.

Drs. Finlay and Delgado, of Havana, have published in the *Revista de Ciencias Medicas* some statistics of their practice of inoculating persons newly arrived in Cuba against yellow fever by means of mosquitoes which have been caused to contaminate themselves by stinging a yellow fever patient. These observations have been carried on for the last ten years, and, in addition to a certain number which are still incomplete, may be said to consist of fifty-two cases of mosquito inoculation which have been fully followed up.

Of these, twelve experienced between the fourth and the twenty-sixth day after inoculation a mild attack of yellow fever, with or without albuminuria; twelve experienced no symptoms of yellow fever either within twenty-five days after the inoculation or during three years subsequently; twenty-four experienced no symptoms within twenty-five days, but contracted a mild attack before the end of three years, either uncomplicated by albuminuria altogether or with only a very transient appearance of it; three who had had no symptoms within twenty-five days contracted well marked yellow fever within three years; one patient who had a mild attack in consequence of inoculation contracted a severe attack later on, which proved fatal; that is to say, that of those who had been inoculated, only about 8 per cent contracted the disease in a well marked form, with a mortality of under 2 per cent. In order to enable us to appreciate the significance of these figures, the authors mention that they observed sixty-five monks who from time to time arrived in Havana, where they all lived under similar conditions. Thirty-three of these were inoculated, and thirty-two were not. Only two of the inoculated contracted well marked attacks, which, however, did not prove fatal, whereas eleven of those that had not been inoculated were severely attacked, no less than five dying. It is remarked that inoculations performed in the cold weather are not entirely trustworthy, and that they should be followed up by a repetition in the spring, also that experience shows that a person who has been three years in the city without contracting the disease has become "acclimatized," and is very unlikely to be attacked at a subsequent period.—*Lancet.*

Prizes for Road Photographs.

To stimulate the collection of photographs to be used in showing the need of improved roads in the United States, the New York and Connecticut divisions of the League of American Wheelmen offer prizes aggregating one hundred dollars for the best collections of photographs of such subjects as most strongly illustrate the unfitness of the present public roads (especially the common "dirt" roads) to be used as public highways, including photographs showing the common spectacle of the farmer's team or the merchant with his loaded wagon vainly trying to drive his patient team and load out of the inevitable mud hole, and other pictures illustrating the goodness of good roads and the badness of bad roads—the proper thing in this line.

Each photograph must be accompanied by a full statement of particulars, giving date, location, etc., by which the picture may be identified. The competition will close on the first day of May, 1891.

THE Smithsonian Institution has just published the first bulletin of the United States Board on Geographical Names. The board was organized in April, 1890, for the purpose of removing a growing evil in the government publications. There was a difference in orthography and nomenclature in the different bureaus charged with publication, and even a lack of harmony in those of a single bureau. The new board received the formal sanction of the government by an executive order dated September 4, 1890. Lieut. R. Clover, Hydrographic Office, Navy Department, is the secretary, to whom all communications should be addressed.