## POPULAR SCIENCE.

**EXPERIMENTS AND INVENTIONS** INTERESTING TO ALL.

Marvelous Strides Recently Made Mochanical World-Chemical and Electrical Wonder Workers Revenitog Hidden Treasures.



CIENTISTS of England have been giving a great deal serious consideration to the study of a mere toy which they are still unable to satisfactorily explain. It is a top called the "artificial spectrum

THE MYSTERIOUS TOP. top," in which mere tracings of black and white are made to

assume colors when in motion. The top as now constructed consists of a revolving disc, half black and half white. On the white half are short, concentric arcs of black. When the top revolves close under a bright lamp these arcs appear, not as gray lines, as might be expected, but as lines of color. To most eyes the effect is as follows:

(1) When the revolution is such that the black line is preceded by the black half of the disc and followed by the remainder of the white, it appears red; (2) when the direction of rotation is reversed it appears blue; (3) when the lines are on the central portion of the white (so as to have equal white immediately on each side) the color is green; (4) intermediate positions give approximately the intermediate colors of the spectrum. A few people see the colors differently, and one or two people, by no means color blind, can see no color at all. Curiously enough, a few people who are somewhat color blind can see the colors on the top very well.

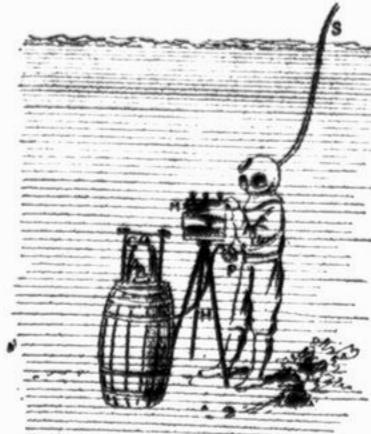
Molasses Pavements.

Perhaps the oddest pavement ever laid is one just completed at Chino, Cal. It is made mostly of molasses, and if it proves all of the success claimed for it, it may point a way for the sugar planters of the South to profitably dispose of the millions of gallons of useless molasses which they are said to have on hand. The head chemist of a sugar factory at Chino, Mr. E. Turke, was led to make certain experiments, of which the new sidewalk, a thousand feet long, from the factory to the main street, is the result. The molasses used is a refuse product, hitherto believed to be of no value. It is simply mixed with a certain kind of sand to about the consistency of asphalt and laid like an asphalt pavement. The composition dries quickly and becomes quite hard, and remains so. The peculiar point of it is that the sun only makes it drier and harder, instead of softening it, as might be expected. A block of the composition, two feet long, a foot wide, and one inch thick, was submitted to severe tests and stood them well. Laid with an inch or so of its edges resting on supports, it withstood repeated blows of a machine hammer without showing any effects of cracking or bending.

Submarine Photography. Mr. Louis Boutan has made some in-

teresting experiments in submarine photography. He is an ardent student of zoology, and during the investigations he made on the shores of the Mediterranean he was so impressed with the beauty of the sights offered that he concluded to make some effort to represent them by pictures as we!! as words. His first experiments were made at a slight distance under the surface of the water, where the intensity of the light is still sufficient for the production of photographs; he constructed a camera and an instantaneous shutter especially adapted for use in water. Finding it desirable to take pictures at greater depths, Mr. Boutan resorted to the employment of artificial light, and employed an apparatus whose construction is shown in the

The apparatus comprises a barrel, T containing oxygen and carrying a glass globe, C, in which is placed a lamp, A having a wick impregnated with alco-



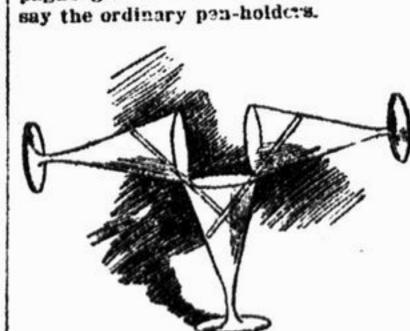
hol. The operator, by pressing the bulb P, at the end of the tube, H, may throw some magnesium powder into the flame or otherwise produce a flash light within the globe, C. The operator puts on a diving suit provided with the usual air supply pipe, S, and places his camera M, which is watertight, in proximity to the oxygen barrel, T, so that he can readily actuate the shutter and the flash light apparatus.

## Rattlefield Cremation.

In view of the terrific slaughter by means of the latest improved munitions of war, it has been suggested that some steps must be taken toward providing for the removal of the dead which would so encumber the ground as to make action and locomotion extremely difficult. It has been proposed that crematories be started for the purpose of disposing of the dead. While it is clearly apparent that something must be done in this direction, it seems an exaggerated form of brutafity to dump | shillings for a pair of gloves.

the dead into crematory furnaces in this way. There is also the very gravest danger that careless and unfeeling employes may pick up men who are only stunned or who may have fainted and plunge them into the flery vortex. It is a well-understood fact that men have lain for hours on the battlefield dead to all appearances, and such might easily be gathered up by ignorant or unobserving attendants and consigned to the flames. It would be very much better to prepare temporary receiving hospitals, where all men not absolutely shot to pieces could be removed and examined. Then the crematory might do good work. There is, however, a melancholy satisfaction to surviving friends in the idea that the bodies of their loved ones who have fallen in battle may be brought home to them and buried in the family vault. Battlefield crematories are not likely to come into general favor among people of delicate sensibilities.

Triplet Glasses. To perform this pretty experiment you need three old-fashloned champagne glasses and two wooden sticks,



the illustration almost explains itself. You will have to try it tentatively, so as to get the exact point inside the glasses, where the stick will serve the purpose desired, but it may be done by careful bandling.

Having succeeded in doing this, see whether you cannot place three glasses upon a fourth in the same way.

The Vesicating Constituent of Croton Oil

In a communication made to the Royal society, Mr. Wyndham R. Dunstan, M.A., F.R.S., and Miss L. E. Boole, lecturer on chemistry in the London School of Medicine for Women, record the results of an experimental inquiry into the nature of the vesicating constituent of croton oil. According to the research of Buchheim, and more recently of Kobert and Hirscheydt, the vesicating action of croton oil is due to an acid closely allied to oleic acid, which has been given the name of crotonoleic acid, and which is now prepared for medical purposes on a large scale in Germany. The process consists, broadly, in the formation first of barium crotonoleate, and the subsequent decomposition of this with dilute sulphuric acid, and extraction of the liberated crotonoleic acid as a viscid oil with ether. By a process of fractional precipitation, using lead salts, the above investigators were able to separate from this so-called crotonoleic acid a large proportion of inactive oily acids, till at last they were successful in obtaining, by a series of operations in which alcoholic extraction and separation by means of lead oxide were made use of, a resinous substance having extraordinary power as a vesicant. The composition of this resin is expressed by the empirical formula C13H18O4. All attempts to crystallize or to obtain crystalline derivatives failed. It is a hard, pale yellow, brittle resin, nearly insoluble in water, light petroleum, and benzene, but readily dissolved in alcohol, ether, and chloroform. In regard to its constitution it is concluded that the vesicaling constituent of croton oil is a lactone or an anhydride of complicated structure.

Electricity on Japanese War Vessels. The firing of great guns and the explosion of shells appears to have effect of disarranging some of the electrical devices on war ships. Japanese legation in Paris has warded to the French government report relating to the recent naval com bats, in which it is stated, with gard to the electric installations board the mikado's warships, that the interruptions of current which took place were not caused, as has been said, by the recoil of the guns, but by the bursting of Chinese shells. The working of the ordnance maneuvered by electricity was not interfered with. The electric wires used for iginiting charges were, however, broken by the vibration set up by the firing of the heavy guns.

Electrical Notes.

It is said that electric lamps run by storage batteries last twice as long as lamps operated directly from dy-

Any galvanometer having a resistance which is large in proportion to the current to be measured can be used as a voltmeter after calibration.

In an arc lamp, supplied with a direct current, the consumption of the positive carbon is in round numbers | Myers, the inventor, in Herkimer counone inch per hour, and of the negative | ty, N. Y. Experiments have been concarbon one-half that amount.

Aluminum has the least electrical resistance for a given length and weight and mercury has the greatest; but for a given length and sectional area, annealed silver has the least resistance and bismuth the greatest.

battery, it should be gone over carefuly, and any cell that is not up to the standard should be taken out of the circuit, and put in working condition before being replaced.

S. P. Thompson says: "You will get the given amount of magnetism and traction, with the least amount of magnetizing force, when you have the area (of the magnet) as great as possible and the length as small as possible."

Catherine de Medici paid about 4

## T EXCITES INTEREST

THE SUCCESSFUL TRIP OF THE BICYCLE FLYING MACHINE.

How a New York World Reporter Easily and Safely Guided the Ship-The Seueation of Being High Up in the Air.



BOND HAS BEEN TO BEEN TO BE AND A SECURITION OF THE PARTY OF THE PARTY

interest has been aroused by recent successful "The World," New York. the ascent was

been talked about for weeks past. Ordinarily, a person hears a story about | point the machine in any direction he an airship or a flying machine with a pleases. When the wind is blowing good deal of scepticism, but when one very strong it is best to point the foris confronted with evidence in the shape | ward end directly to windward, as, owof the machine in actual operation, it | ing to its peculiar shape, the balloon is difficult not to believe. And that is part of the structure offers very little the sort of evidence that was provided resistance in this position. The air for thousands of persons just two strikes the point first, and then seems weeks ago Saturday, who were so fortunate as to be on the spot when "The | convex surface. It is thought by some World" rose proudly and intelligently scientific men that an object may be into the air, or who chanced to be somewhere in the line of its flight from under these conditions, it being argued Brooklyn to New York city, back to that the wind passes around the sides Long Island and thence to Yonkers, of the structure and closes in behind, says the New York World. The entire giving the whole machine a forward trip was made pursuant to a set design | tendency. The ball nozzle has been ex- | all about lions, as he had read a book on The position of the glasses shown in of the World reporter, who operated the plained on this principle. machine. It was no foolhardy venture, and the outcome could hardly have been | made by the reporter in practice an- forced his way through the crowd.

Around this ring are arranged a number of bags of sand which are of convenience in ascending and descending. and within easy reach are the handles to a pair of wings, one extending outward on either side. These wings are the guiding agencies, as there is no rudder. When it is desired to rise, the

operator cants himself backward in hi seat, thereby throwing the wings at slight upward inclination. The propel ler being in brisk motion, the tendency XTRAORDINARY is to draw the machine forward and to push it upward.

The device is so simple that one would scarcely expect it to work, ye of the by this means the reporter has ascended often to heights of 1,000 to 2,000 feet in The operation is reversed when the aeronaut wishes to descend. In turnthe eastern part of ing around, either one or the other of Brooklyn, where the side wings is turned so as to offer its surface to the wind. The other side, made, little else has | meeting no resistance, swings around immediately. The operator may thus to loose its force in passing around the even moved forward towards the wind

THE LIONS ROARED.

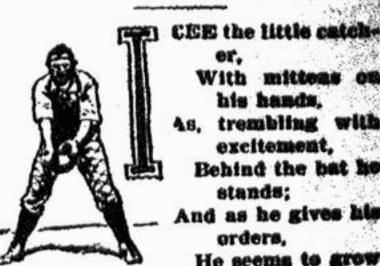
They Recognises Their Gid Friend and Wers Overloyed.

Considerable excitement was caused in the big zoo at Glen Island by an incident which demonstrated the memory and sagacity of a huge African Hon, and a lioness. The beasts had been yawning before several thousand people, when something suddenly attracted their attention. They bounded against the bars of the cage as if in a vain at. tempt to gain their freedom, and at the samo time let out a series of roars that could be heard half a mile away. The tigers in the adjoining cages became interested and added their roars and growls. In an instant every animal in the big zoo, and there are over 1,000 of them, had joined in the frightful chorus. The shrill bark of the hyenas and wolves was heard above the rest, and added actual terror to the scene. Finally the huge elephant Siam caught the fever and, holding his trunk high in the air, gave a roar that was plainly heard at the other side of the sound. The fawns and deer and the little baby zebu dashed into the sheds, trembling with fright, while the monkeys groveled with terror at the bottom of their cages. Walter Bannister, the keeper, and half a dozen assistants were at once on the scene to make an investigation. It puzzled them. There was no apparent cause for the excitement, yet the big lions continued their roars and bounded about the cage. "Turn the hose on him; he's got mad," suggested one of the spectators, who said he knew animals in his boyhood. Things were During the sixteen or eighteen trips | becoming furious, when an elderly man

## OUR WIT AND HU

POINTED PRODUCTIONS OF T FUNNY WRITERS.

Original and Selected Paragraphs Dished Up Especially for Our Lean Road Pussing Events as Vlowed from Humoriste' Standpoint.



With mittens on his hands. As, trembling with excitement, Behind the bat he stands; And as he gives his orders, He seems to grow

in size, "Come, get some ginger in yer! Two out! Play ball!" he cries.

He's slender-built and wiry, With freckles on his nose. Could be throw down to second? Well, hardly! you'd suppose. But see how quick he s snatching The ball from off the bat, The runner's surely beaten-"Hey, Empire, how was dat!"

"Dat bluff don't go now, Mugsey!" I hear his angry shout; "Come in, de game is over; De Empire says yer out! Yer in de soup, youse fellars; We's beat yer by t'ree runs! De Victors always gets dere-We is de cham-pe-uns!" -- Detroit Free Press

An Unpopular Minister. It was one of those cozy viliages of bonnie Scotland, where gossip is the chief barter and church the chief duty of every "mon" and all the "weemin." For once gossip and church were traveling the same way, for Dongold McSorlie, the minister, had suddenly grown unpopular, and the numbers of his congregation were steadily diminishing.

No one knew better than he that something must be done; so he concluded to do a little house to house missionary work, and thus arouse more intoront in church affairs,

But his enthusiasm was short live The first man he accosted was Donnie Campbell, a sturdy old Scot of wellknown free-thinking tendencies. "Tonald," began the minister, "for why were ye no' at the kirk last Saw-

bath?" "I was at Mr. McShouter's kirk,

This was hardly the reply that was expected, but the minister continued. with added gravity: "I dinna like ye rinning about the strange kirk f this way. I am pairfeckly sure ye yernel widna like yer ain sheep strayin' awa' into strange pastures." "I widna care a grain, meenister,

it was better gress."- Boston Bud

A Good Cheten. How true it is that fame and fortune both hinge on some trivial circumstances. The most successful artist at

Salon one year was a young gentleman named Baldwin Sowers. Mr. Sowers' particular line is the delineation of still life, and so he painted

the annual exhibition of the French

a cheese. After it was hung some malicious person slipped into the gallery the night before the exhibition and cut round hole in the canvas, completely removing the cheese. When the examining committee were on their rounds they came to the defaced picture and angrily sent for the artist to give an explanation. An ordinary individual would have been overcome with despair at the outrage. Not so Mr. Sowara, When the chairman said, sternly:

"Where is the cheese?" he responded "Alas, gentlemen! I perceive I have painted it with too great fidelity. The

mice have eaten it."—Exchange.



School teacher-Your little boy Hans. wasn't at school yesterday, Mr. John

Mr. Johanisberg (of the Bowery) No, I vas makin' der parrel of m kraut, and I vanted Hans to down mit his feet.-Texas Siftings.

For a long time they had "I have it," he exclaimed, su

"Reginald."

"Yes, I have it at last." With eager, trembling hand th wrote the beautiful thought w come to him, while his wife ly wait to get her honnet before she rushed over to neighbors' to tell them the street.- Detroit



other than successful, although many who saw the ascent marveled at the aeronaut's daring, and expressed themselves as being satisfied to remain on the earth. The reporter, however, had carefully experimented with the airship before making this ascent in pub-He was fully aware, in the first place, that the trip would be just as safe as a ride in a trolley car, and, perhaps, indeed, a good deal safer. And, in the second place, he was perfectly confident that he would be able to guide the machine, though a rather stift wind was blowing at the time.

No claim is made here that the World's airship is a mechanical bird, or a miraculous invention, which can be made to fly rapidly in the teeth of a flerce gale. Any such claim is absurd on its But it is asserted with perfect sincerity that a machine has been devised and constructed which is capable of being guided at the will of the operator, when the weather is anything like favorable. Such a machine is the World's airship. Such a machine was that which has solved the problem of aerial navigation.

The reporter had become familiar with the manipulation of the airship at the "Balleon Farm" of Prof. Carl E. tinued over a considerable period, the idea being to make the ultimate trial at New York city a success, and to eliminate every possible feature that could contribute to a failure. The reporter had little difficulty in getting the knack of the machine, and it was not long be-Before beginning to charge a storage | fore he could handle it as deftly as the professor himself.

> It will be remembered, according to the description and illustration printed in the Sunday World, that the airship is propelled by a huge sail propeller, operated by a pair of pedals, quite simflar to those used on a bicycle. The main part of the machine is shaped somewhat like a spindle, being a double-pointed bag of cotton material, which is filled with hydrogen. The propeller is situated in front of the op-

other method of guiding or of assisting in guiding the airship was discovered. This is to incline the body in whatever direction it is desired to go, In order to turn to the right or left, it is simply necessary to lean in the direction desired,

In fact, the whole process is so simple and the sensation of being so high in perfect safety and with the power to control one's movements is so agreeable, that once you have made a trip you will be a confirmed sky bicyclist. When moving about the upper atmosphere at pleasure the air navigator feels a sort of pity for those who are so unfortunate as to be forced to remain on the earth. They are subject to all terrestial conditions-to earthquakes, lightning and tempest and due process of the law. The World airship he caressed them. The beasts had navigator, on the other hand, may escape all these inconvenient things. He can approach the earth near enough to was not known that they were trick carry on a conversation in a moderate lions until Mr. Leroy informed Mr. tone; and then, with a simple movement of the body, a slight change in Tribune. the inclination of its axis, he soars upward above your head until his flight is stopped only by the absence of sufficient air to breathe, or by fatigue of

the leg muscles. operated entirely by leg power, which, of course, is more or less unsatisfactory. In a quiet atmosphere, when there is no or very little wind blowing, whale did swallow Jonah, and therefore one can get along very well by simply it must be true. Rev. Pinkham became pushing the pedals. When a violent gale, is blowing, however, it would be Sunday morning he placed on either desirable to have some more vigorous side of his reading desk a kettle of beer. motive power. If some such power which he said he had bought on his were provided the machine might easily make its way into the eye of the

Nearly Effled by a Receter.

A 10-year-old Waterbury, Conn., girl named Teems met with aspeculiar accident, in which she nearly lost her life. day, and can do a 10-mile turn without She began teasing a rooster, which turned and attacked her in the face. severing the temperal artesy. The child erator, who is seated on a bloycle-sest | was bleeding to death when the paysiwithin a concentric ring of steel. ofan arriged and stopped the flow.

"This is all my fault, sir," he said to Mr. Bannister. "My name is Tom Leroy, and I've handled lions all my life." As he spoke he stepped over the railing. Mr. Bannister at once recognized the name and made way for him. The man went close to the cage and thrust his two arms between the bars. The lions for a moment seemed frantic, then quieted down and began to lick the man's hand as the crowd fell back, expecting each instant to see the man injured. He explained to Mr. Bannister afterward that he had trained the lions to do many tricks years ago, and had traveled with them for many seasons. He had not seen them for some years, yet they recognized him the moment he came within sight of the cage, and made an uproar that was quieted as soon as passed through several dealers' hands before coming to Glen Island, and it Starin's representative.-New York

Couldn't Swallow the Whale Story. Rev. Henry W. Pinkham, pastor of a Baptist church at Bridgeport, Conn. recently preached a sermon about Joh-In its present condition the airship is ah, in which he took the stand that the whale did not swallow the prophet. Now, he is going to resign because his congregation says the Bible says the prominent some months ago, when one way to church.

> Baby Bliss' Pacing Mate, Omaha's smallest cycling expert is a child 4 years old. She rides a 16-inch wheel. She takes long rides in the country with her mether almost every the least evidence of fatigue. She has made several exhibition rides at fairs, the last at Ottumwa, Iowa, where she rade withership Bliss, the 482-ne sider of Chiengo