

# SCIENTIFIC AMERICAN

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In this stage illusion the spectators see an apparently unsupported figure floating in the air, revolving and rotating with several motions at the same time.

A CURIOUS STAGE ILLUSION.—[See page 295.]

formed. Some metal particles having been scratched off with a small metal tool, one of them, on being dropped on white paper, was found to produce a dark spot as by combustion. On coming into contact with water, these metal particles instantaneously decomposed the latter most energetically, dissolving the greater part of it, which would seem to show the solubility of the oxide. A blackish residue, which doubtless is the nitrogen compound produced by the reaction of the metal and air, would be dissolved nearly completely after adding a very small quantity of hydrochloric acid. Having been dissolved practically completely in the diluted acid, the metal could not contain any appreciable amount of mercury.

The iron vessel containing the remainder of the metal was then introduced into a tube which was sealed in the vacuum. This is to serve in measuring the penetrating radiation of the metal and ascertaining whether its radio-active properties really correspond to theoretical calculations.

Though the radio-active equilibrium has not yet been reached, the first tests would seem to show the increase of activity to occur in accordance with the law of the production of emanation, the limit of radio-activity of the metal being about normal.

As metallic radium is much more volatile than barium, the two experimenters expect to purify it by sublimation in the vacuum on a cooled metal plate.

#### A CURIOUS STAGE ILLUSION.

The stage illusion which constitutes the subject of the front page illustration of this week's SCIENTIFIC AMERICAN was invented several years ago by Mr. Robert B. Smith, an Australian inventor, now a resident of New York.

Thanks to an ingenious mechanism, it gives the effect of a figure which not only hovers in the air apparently unsupported, but of a figure which has simultaneously three motions—one revolving motion in a vertical plane, another a rotary motion around the longitudinal axis of the figure itself, and a third, which will be apparent from the following description of the mechanism itself.

The illusion consists of a wheeled truck on which two posts are carried, tied together at the top by a cross piece, the whole constituting a kind of guillotine frame. Between these two posts a block slides vertically like the knife of a guillotine. Through the sliding block a horizontal shaft runs which carries a large wooden disk about 12 feet in diameter, covered with black velvet, a large sprocket wheel, and a small sprocket pinion. The sliding block can be raised and lowered by means of a steel cable attached to its top, and passing over two pulleys on the cross piece connecting the two posts, and then down to a windlass on the truck, as shown in the rear elevation on the front page. The large sprocket wheel is connected by a chain with a small sprocket pinion carried on a short steel shaft passing through the wooden disk near its periphery. The short shaft is provided with a bevel gear which meshes with a second bevel gear mounted on a short shaft parallel with the large wooden disk, and supporting a small circular platform upon which the performer is supported. The small sprocket pinion on the inner end of the driving shaft which carries the large wooden disk is connected by a chain with a small sprocket pinion secured to the bottom of the sliding block and operated by a crank. By turning the crank it is evident that the performer who is supported on the platform is rotated on her longitudinal axis, and that the large wooden disk is revolved, so that she is given two motions at the same time. By operating the windlass which raises and lowers the sliding block, which is done by another man, she is given a third motion, the entire wooden disk being raised and lowered as the sliding block rises and falls.

The performer, preferably a woman, must wear a special steel harness under her costume, the harness being supported by two straps passing over her shoulders and two around her thighs. Her waist is surrounded by an iron hinged belt fixed to the harness. To the back of the belt a steel rod is attached. On the end of the rod, which is bent to fit the performer's figure at the back, is a metal journal, which journal is riveted to the rod. The rod passes only half way through the journal, so as to permit the shaft running parallel with the black wooden disk to enter. By means of a thumb screw the rod running from the belt is secured to the bevel gear shaft running through the circular platform upon which the performer stands.

The truck is pushed out upon the stage, previously draped in black, so that the performer seems to float across the stage. In order to heighten the effect of the illusion, the stage manager may pass a wand completely around the performer, as shown in our front page illustration, so as to make it appear that she is not at all attached to any object.

Under the name of "Ione," this illusion has puzzled many music hall habitués. It completely deceived the late Mr. Charles Bertram, who was considered in his day one of the best English magicians. It was impos-

sible from the auditorium to discover that there is a fixed wheel in the mechanism, for the entire stage is draped in black and the large disk on which the performer is carried is covered with black velvet, as well as the platform on which she stands. A black shield hides the bevel gearing.

#### The Current Supplement.

The recent French military maneuvers have unquestionably demonstrated the efficacy of the aeroplane as a weapon of war. The Paris correspondent of the SCIENTIFIC AMERICAN was present at the maneuvers, and in the current SUPPLEMENT, No. 1815, gives an able account of what the aeroplane accomplished.—The third instalment of Mr. Edward H. Guilford's article on the construction of a thousand-mile wireless receiving station is continued.—Gradually the Holy Land is being covered with a network of railways, and the screech of the locomotive may to-day be heard not only in Jerusalem, but on the shores of Galilee, in Nazareth, and in many other places associated with Biblical history. Mr. Harold J. Shepstone presents an excellent account of these Holy Land railways, accompanied by some interesting photographs.—Fine old pieces of furniture are prized by collectors largely because age has given a new beauty to the wood. There are many artificial methods of giving to wood this artistic appearance. The methods by which this can be done are described very ably by H. Wislizenus.—In an article entitled "Experiments in Animal Psychology," Mr. B. Forbin scientifically disposes of many of the absurd fables that are still accepted, such as the scorpion who stings himself to death, the instinctive desire to kill mice supposed to be possessed by cats, and the like.—Mr. O. Ivan Lee contributes an interesting paper on a possible extension of the periodic law, in which he presents a consideration of the Lothar Meyer curve for 1909.—The second instalment of Prof. Millikan's paper on the isolation of an ion is presented.—Mr. S. S. Hough recently delivered before the Royal Society of South Africa his presidential address on the aims and methods of astronomical research. An abstract of his paper is published.

#### Official Meteorological Summary, New York, N. Y., September, 1910.

Atmospheric pressure: Highest, 30.31; lowest, 29.79; mean, 30.08. Temperature: Highest, 90; date, 6th; lowest, 54; date, 20th; mean of warmest day, 80; date, 6th; coolest day, 62; date, 19th; mean of maximum for the month, 75.1; mean of minimum, 61.7; absolute mean, 68.4; normal, 66.5; average daily excess compared with mean of 40 years, 1.9. Warmest mean temperature of September, 72, in 1881; coldest mean, 61, in 1871. Absolute maximum and minimum of September for 40 years, 100 and 40. Average daily excess since January 1st, 2.5. Precipitation, 1.43; greatest in 24 hours, 1.17; date, 1st. Average for September for 40 years, 3.59. Accumulated deficiency since January 1st, 8.41. Greatest precipitation, 14.51, in 1882; least, 0.15, in 1884. Wind: Prevailing direction, northwest; total movement, 5,953 miles; average hourly velocity, 8.3 miles; maximum velocity, 35 miles an hour. Weather: Clear days, 10; partly cloudy, 13; cloudy, 7; on which 0.1 or more of precipitation occurred, 5. Relative humidity, mean of 8 A. M. and 8 P. M., 72.9. Thunderstorm, 6th. Dense fog, 5th and 6th.

#### Sardine Bait.

French sardine fishers use, as bait, the roes and other waste products of the Norwegian cod fisheries. This bait is expensive and its price is continually rising, owing to the increasing demand. An artificial bait, which is much cheaper, has recently been employed, but with only partial success, as it sinks too quickly and often lures the sardines downward, instead of drawing them up into the nets. Attempts are now being made to remedy this defect. The success of these attempts would bring joy to the fishermen, but not to the dealers in Norwegian bait who enjoy a very lucrative monopoly. The question is one of burning interest and has nearly led to open war between fishermen and bait dealers on the French coasts.—Cosmos.

#### Return of the Brooks Periodic Comet.

BY WILLIAM R. BROOKS.

The Brooks periodic comet was observed at its return on September 30th with the large telescope of the Lick Observatory in the constellation Sagittarius in right ascension 19 h. 47 m. 51 s.; declination south 28 deg. 8 m. 39 s. This very interesting comet was discovered by Dr. William R. Brooks at the Smith Observatory, Geneva, N. Y., on July 6th, 1889; and computation soon showed that it was moving in an elliptical orbit, with a period of revolution around the sun of seven years.

It was observed at its succeeding returns in 1896 and 1903, and now has again swept into view, true to

its predicted time. It is now only visible in large telescopes.

Another interesting fact concerning this comet is that it was found to be attended by four companions moving along through space with it. Although this has been noted in connection with some of the large comets, notably the great comet of 1882, it is quite unique among telescopic comets, and it is sometimes called the Brooks multiple comet.

## Correspondence.

### THE LATEST ARGENTINE, AMERICAN AND BRITISH BATTLESHIPS.

To the Editor of the SCIENTIFIC AMERICAN:

In an article in a recent issue of your paper you give a very interesting comparison between the U. S. S. "Wyoming" and Argentine ships now building. In speed the Argentine ship is the better, both in smooth and rough water, and the ship that has the greater speed, all things being nearly equal, is in the better position, for she can compel the other ship to fight on her terms. In radius of action the Argentine ship is also superior. These two would, in many cases, decide the combat, especially if both ships put to sea about the same time. In gun power the two designs are nearly on a par, the Argentine ship having the advantage, owing to her having the speed; for instance, she could take a range that would make the 6-inch gun effective on her opponent when the 5-inch gun would not be nearly so on defensive armor. While it is thinner in places in the Argentine ship, her commanding officer could, if skillful, offset that by again using his superior speed, for he could maneuver so that his opponent's shot would strike his thinner armor obliquely, and so make it of equal resisting power. The Argentine vessel being the larger and heavier, would keep her speed in a seaway better and would be a steadier gun platform. The freeboard and height of guns are so near alike that there is no real advantage in favor of the "Wyoming." The one turret which is higher on the "Wyoming" would have no material advantage over the other ship in a heavy sea, at all events, as the Argentine ship would be steadier. Moreover, the higher the gun the wider arc it describes as the vessel rolls. Finally, some of the guns at all events are father apart on the Argentine ship, and that also is an advantage. I think there is no doubt that naturally the designer, with larger dimensions and 3,000 tons more displacement at his disposal, can produce the better ship; and in summing up everything, you can't put a quart of power in a pint of displacement, designers being equal.

Now, as regards these ships being the most powerful, excepting the one being built for the Brazilian government by the Armstrongs, you will please excuse me if I take exception to that remark. There were launched a few weeks ago, and also a week or two later, two ships for the British navy, one of which is as powerful as either of these two designs, and the other more powerful than either of them. I refer to the "Lion" and the "Orion." The "Lion" is known as a battleship cruiser. She is 700 feet long, the longest warship in existence; displaces 26,000 tons, and is designed to steam 30 knots; carries armor 9 inches thick and eight 13.5-inch guns, all on the center or axial line of the ship. Here is a ship so much faster than either design that she can easily outmaneuver them and do it so that her 9-inch armor would be practically equal to their heavier armor. In gun power she carries guns of far greater range and penetration; also the eight guns practically fire the same weight of metal in a discharge as the twelve on your two designs. Her radius of action is greater than the "Wyoming," and fully equal to the Argentine ship; so that taking all things into consideration, although displacing about the same as the "Wyoming" and less than the Argentine ship, she could fully hold her own with either. With the "Orion" we have a vessel 584 feet long, 87 feet beam, and displacing on normal displacement 22,500 tons; speed designed, 21 knots, and likely to do as well as the "Vanguard," which was designed for 21 knots and made a maximum of 22½ knots. It will be seen that the "Orion" is an easier vessel to drive through the water, she being longer and narrower than the "Wyoming." In speed she is slightly better than the "Wyoming" and not quite so good as the Argentine vessel. In radius of action she is slightly better than the "Wyoming," and perhaps not quite so much as the Argentine ship. In gun power she easily beats both, as it is reported on good authority she will carry ten 13.5-inch guns, all on the axial line of the ship. In defensive armor she is the equal of either one. Here then is a vessel of less tonnage and more powerful than either one, provided it is true that she is to carry a 13.5-inch gun. The gun in question is 45 calibers long, weighs 86 tons, throws a projectile of 1,250 pounds with a muzzle velocity of 2,850 foot seconds, and is the most powerful piece of ordnance in existence on any ship or in any country.

Halifax, N. S.

W. R. SHUTE.