

lated by the distance between the rolls. After passing through the calender the coated burlap is drawn into the heater, where it remains several days under a temperature of about 160 deg. Fahr. Much of this linoleum is sold plain, but that which is to be printed takes its course to the printing room, where it runs through a machine that lays on the required designs in colors.

The invention of a printing machine for linoleum marks one of the most important improvements in the industry. Many experiments were made along this line, but it was not until the year 1892 that a successful high-speed printing machine was built, and this was installed at the Thomas Potter Company's plant in Philadelphia, Pa. This machine proved such an unqualified success, that it is being used to-day without any material change. It has a range of from three to nine colors, working on an area of about 120 square yards at one time, completing 18 inches of the design, full width, at each impression, and printing about 24 square yards a minute. In the old-fashioned way of hand printing, two men working together could print about 150 square yards per day. Now, each machine produces approximately 8,000 square yards daily, doing the work of over 100 men.

After leaving the printing machine, the goods pass into a heater, and are left there under a temperature approximating 145 deg. Fahr. until thoroughly cured and ready for the market. In this connection it might be well to mention still another grade of linoleum known as "cork carpet." As the name implies, this grade is composed of linoleum composition with a much larger percentage of cork, and is made in greater thicknesses than the plain linoleum.

In the early days the use of linoleum was confined almost entirely to kitchens and vestibules of private residences, but as years passed, its wonderful utility became more widely known and appreciated until to-day we find it on the decks of modern men-of-war of all nations, steamships, pleasure boats of all descriptions, automobiles, parlor cars, hospitals and sanitariums, dining rooms, cafés, colleges and Sunday schools—in fact, its uses are too varied to enumerate.

THE MAKING OF OILCLOTHS.

The burlap used in oilcloths is first drawn through a sizing machine, which applies a substance to fill up the interstices and prepare the surface for the priming which follows. After the priming the burlap is dried in a heater, and it is then ready to receive the coatings of red paint. These coatings (from three to five according to the quality of oilcloth to be made) are applied by machinery, the burlap being passed under a knife blade, set by screws, which distributes the paint evenly and regulates the quantity. After each coat the goods are run into the heater, and dried before receiving the succeeding coat. This done, the prepared burlap is passed through a pumicing machine, which makes the surface smooth for the printing. The process of printing the design on the oilcloth is done in the same way and with the same machinery as in the linoleum. After the printing the material is again put in the heater to dry, and then taken to the varnishing machine to receive a finishing gloss. The oilcloth is now passed into the drying room, where it is dried in a few hours.

HOW TABLE COVERS ARE MADE.

Unlike the floor coverings, the foundation of table and enameled oilcloth is cotton sheeting. The rolls of cotton are first run through a calendering machine, and then given several coats of a compound consisting of linseed oil and China clay, with the necessary ingredients to give the desired color. The goods are run into a heater to be dried after each coating. When the several coats have been applied, the goods are passed through a pumicing machine, which removes all rough particles from the surface. The printing machine is a cylinder printing press, similar to those used in the manufacture of wall papers and cotton prints. The designs are etched on copper-covered cylinders, each cylinder carrying a certain color and part of a design. The final stage of the operations is to pass the material through a varnisher, then into the drying room, where it is left for twenty-four hours, when it is ready for the market.

The Siamese Minister of Public Works has received the sanction of the king to the proposal to acquire and construct an entirely up-to-date telephone system in Bangkok. The system decided on is the central-battery system. The minister is now engaged arranging for a new cable from Koh-Si-Chang to Sirachi with connection to Bangkok.

SOME INTERESTING TRICKS.

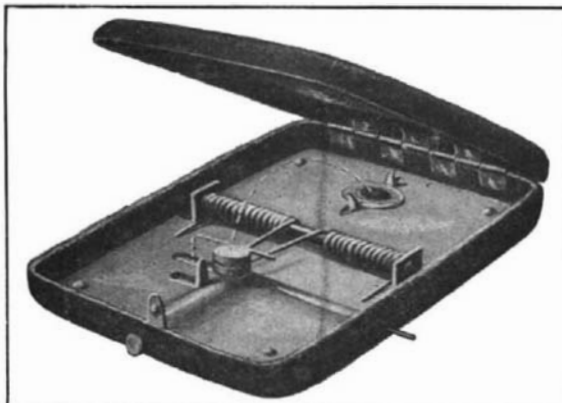
A few little parlor tricks often while away time which would otherwise hang heavy on the hands. One of the best we have seen recently is the "magic sieve." An ordinary wire-cloth sieve with a handle is shown to the larger or smaller audience, but they do not see a celluloid shell which conforms to the bowl of the sieve.



The Magic Sieve.

In performing the trick the celluloid shell is placed out of sight at the back of the bowl. Water is poured through the sieve into the bowl, and it is deposited face downward on the table over the celluloid shell. Both are picked up together and the water refuses to leave the sieve. Both the celluloid shell and the water are turned into the bowl, and the liquid passes through as before to the mystification of the audience.

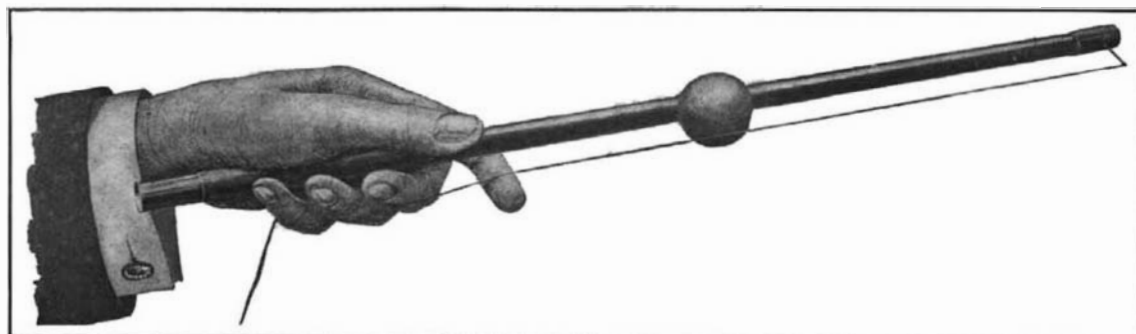
Another clever trick is also easily performed. Anyone attempting to balance a ball around a polished stick will realize the extreme difficulty of such a feat. Nevertheless, the performer having given to the spec-



The Magic Jewel Case.

tator for a minute inspection the wand which he may be using in some other trick, also the ball, proceeds to carefully place the ball at the center of the wand, when it will remain stationary, then it will roll up and down the entire length of the wand, after which the wand and ball are again freely examined.

The trick consists in the use of an ordinary wand, such as magicians use, with metallic ferrules at each end, a duplicate ferrule fitting loosely over the one



A Clever Balancing Act.

SOME INTERESTING TRICKS.

at the end. It is provided with a short thin steel arm projecting from its end at right angles. At the end of the arm is a small iron, to which a fine black thread is attached. The thread is several inches longer than the wand. The prepared ferrule the performer has palmed, and after examination of the wand it is secretly put on its end, the thread is pulled down into the left hand holding the other end, and twisted around the middle finger. The thread on being stretched forms a kind of a bow, and when the bow is placed on the wand the ball will run up and down with the

greatest ease as the wand is lowered or raised. The illusion is perfect, even at a short distance, to the audience, the ball appearing as rolling on the top of the wand. The ferrule is again palmed at the conclusion of the trick, so that the wand may once more be given for inspection.

The "Magic Jewel Case" is an innocent-looking affair covered with plush, and might contain a diamond pendant. As soon as the button is pressed an explosion takes place, and the case opens with a loud bang. A detonator is given a catapult motion by a coiled wire spring and strikes a cap which is secured to the anvil. While the case is being closed, a detent wire passes across the ends of the coiled springs, securing the detonator from coming into action. As soon as the case is closed, the detonator bears against the cover of the case. We are indebted to Mr. Martinka for these tricks.

Official Meteorological Summary, New York, N. Y., June, 1907.

Atmospheric pressure: Highest, 30.23; lowest, 29.52; mean, 29.94. Temperature: Highest, 88; date, 25th; lowest, 45; date, 2d; mean of warmest day, 79; date, 22d; coolest day, 48; date, 2d; mean of maximum for the month, 73.6; mean of minimum, 58.7; absolute mean, 66.2; normal, 68.9; deficiency compared with mean of 37 years, -2.7. Warmest mean temperature of June, 72, in 1888, 1892, 1899, 1906. Coldest mean, 64, in 1881, and 1903. Absolute maximum and minimum of this month for 37 years, 97, and 45. Average daily deficiency since January 1, -1.9. Precipitation: 3.29; greatest in 24 hours, 1.01; date, 29th, and 30th; average of this month for 37 years, 3.25. Excess, +0.04. Accumulated deficiency since January 1, -0.54. Greatest precipitation, 7.70, in 1887; least, 0.86 in 1904. Wind: Prevailing direction, south; total movement, 6,922 miles; average hourly velocity, 9.6; maximum velocity, 48 miles per hour. Weather: Clear days, 10; partly cloudy, 13; cloudy, 7; on which 0.01 inch, or more, of precipitation occurred, 11. Thunderstorms, 5th, 26th.

A New Invention for the Theater.

American theaters have been equipped with so many conveniences, one would suppose every possible need of the theater-goer had been fully supplied. Still, another novelty will make its appearance with the opening of the coming theatrical season, a novelty which is nothing more or less than a very ingenious mirror for the use of women. The invention is known as the opera mirror, and has been patented by Mrs. Bessie M. Suter, of Louisville, Ky. It is so applied that by simply touching a leather fastening it can be placed at any angle, so that a woman may adjust her hat easily and conveniently after the performance. In addition the device provides a means for the disposal of hats and wraps, so that the necessity of spending much time in a cloak room is obviated. Mrs. Suter claims for her device ease of adjustment, simplicity of construction, strength, and durability. The invention was first brought to Mr. Daniel Frohman's attention by Mr. James W. Morrissey, managing director of the Joseph Jefferson Monument Association. Mr. Frohman will probably use it in his New York Lyceum Theater.

CAPTIVE BALLOONS IN THE GERMAN ARMY AND NAVY.

BY DR. ALFRED GRADENWITZ.

Because of the great difficulties frequently encountered in choosing a conspicuous point from which to inspect an enemy's position, captive balloons have been for many years adopted in the German Signal Service. The first type used in this direction was the familiar spherical balloon, which, however, is fit for use only if the atmospheric conditions are favorable. A cylindrical type of balloon was therefore first suggested in 1893 by A. Riedinger, of Augsburg. This balloon, being placed in an inclined position against the wind like a kite, was imparted an upward pull reinforced by the wind itself. But simple though this construction seemed to be, the desirable stability was not obtained before many difficulties had been overcome; in fact, a purely cylindrical balloon with hemispherical ends, so far from being stable, will perform spiral curves in the wind and quickly reach the ground. Lieut. von Parseval, however, developed the balloon to a satisfactory stage of reliability, so that the observers could work freely even in the case of heavy winds.

A schematic view of the improved type of balloon now being used in the German army is given in the

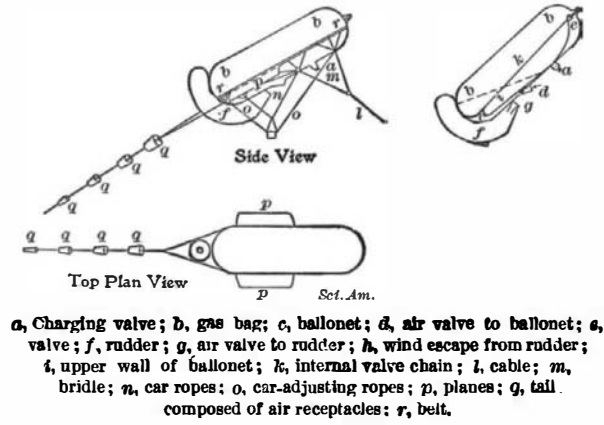
diagram, the principle underlying its construction being as follows: The cylindrical balloon is divided into two compartments, the upper large compartment being the gas chamber and the lower one the "ballonet," separated by horizontal partitions. This is provided with an opening directed against the wind so as automatically to fill with air at the same tension as produced by the arriving wind. This pressure is propagated through the upper ballonet wall into the gas chamber in which there is in addition the surplus pressure of the gas. There will thus be a greater pressure in the interior of the balloon than in the surrounding air. The issuing wind will consequently be unable to produce any hollows in the balloon as is the case with spherical balloons. In fact, spherical balloons which permanently keep their smooth and stable surface are subject to much less oscillation.

The rudder, constituted by a hollow ring applied to the lower rear portion of the balloon, serves to insure a sufficient stability. Like the ballonet, it automatically fills with air, any excess of air escaping from its top. While protecting the balloon against horizontal oscillations, the rudder will keep it in the direction of the wind. The stability is further increased by "wind catchers" which, arranged in the lee of the balloon, and exerting on the latter a constant pull, thereby check any lateral motion. The weight of these "wind catchers" is in turn compensated by planes both to the left and right in the rear part of the balloon alongside its equator, which planes insure additional stability.

against the balloon, cause it to sink by the pull exerted on the ropes.

The rope winch exhibited by A. Riedinger at the Milan exposition is provided with a 20-horse-power gasoline motor, which seems to be an advance over the French type of steam-driven winch; the low position of the drum will be found a decided advantage. The use of such rope winches will greatly increase the scope of military aeronautics, owing to the independence of bad weather which they afford.

Most interesting are the possibilities of kite balloons at sea, where because of heavy gales spherical balloons are quite out of the question. The atmosphere is generally clearer than inland, no dust being stirred up by the wind or any air currents heated by the

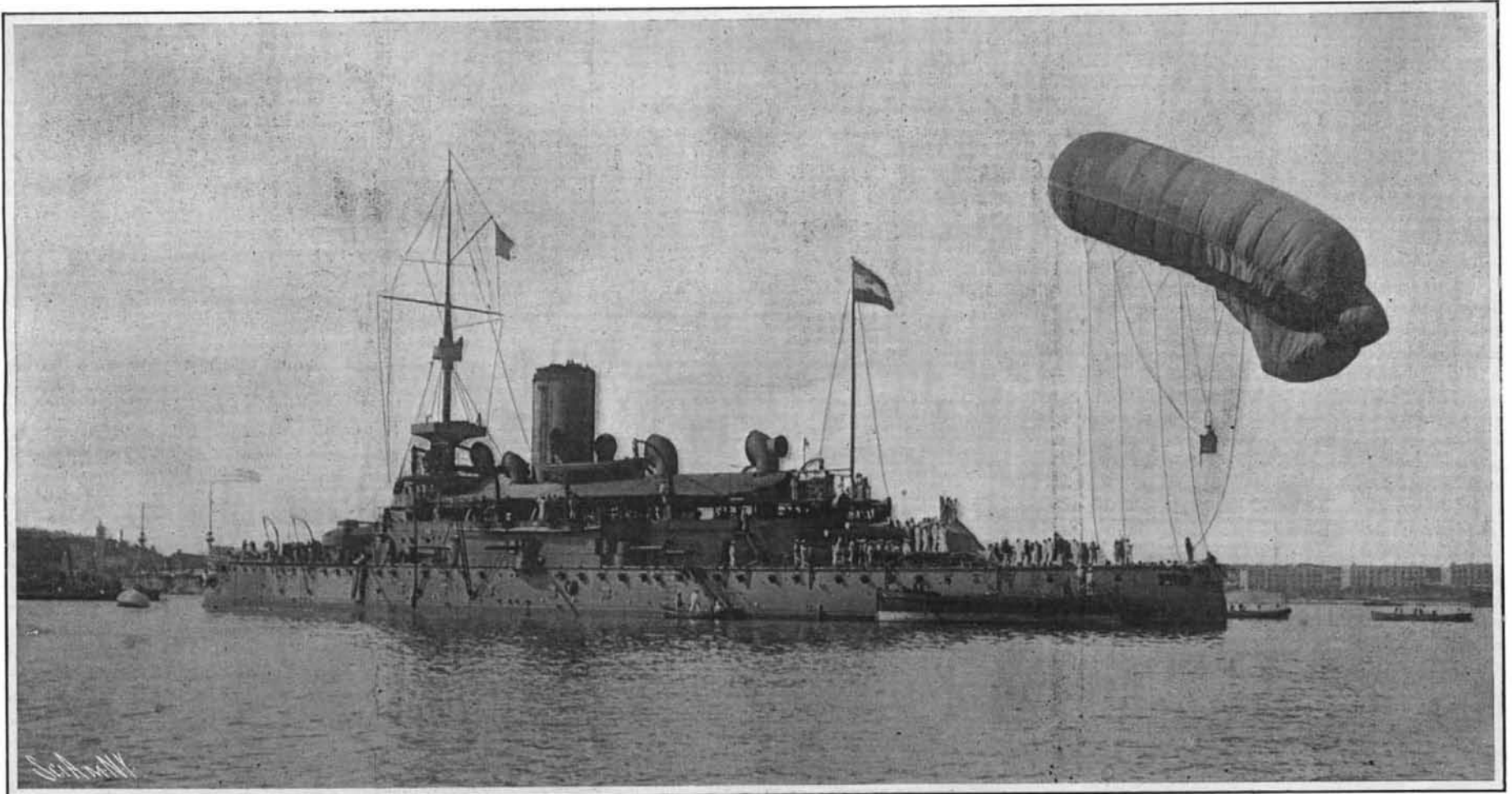


speed. A captive balloon, which had been raised after its disappearance, was able after a few minutes to detect the submarine. It may be said that the search was facilitated by the wash of the submarine glittering in the sun's rays. Moreover, the green color of the submarine was found not to afford the expected protection against discovery.

Moored or floating mines are obviously sighted most easily from a balloon. In fact, any objects to be watched are much larger and far more easily recognized than they are on land because there are no other objects with which they can be confused.

A most important desideratum for kite balloons to be used on the sea is that they should not interfere to any considerable extent with the motion of the vessel. As regards the speed of the ship, this will not be influenced to any appreciable degree by the balloon. Supposing the horizontal component in the cable to be 1,000 kilogrammes (2,205 pounds), conditions will be about as follows in a medium-sized vessel with 4,000 indicated horse-power:

In case the vessel sails 20 knots, that is, about 10 meters (32.8 feet) per second, the effective power of the screw being 2,000 horse-power, or 150,000 kilogramme-meters (484.35 foot-tons), the speed of sailing will be slackened by the pull of the balloon by $1/2 \times 1/5 =$ about 3 per cent, which amount is practically inappreciable. In case the balloon is drifting along the course of the vessel, it will interfere still less with the sailing of the ship. The balloon should be moored to the vessel amidships.



TESTING THE CAPABILITIES OF CAPTIVE BALLOONS WITH THE AUSTRIAN WARSHIP "RADETSKY."

A further safety device is afforded by the gas valve, opening automatically as soon as the balloon, having broken its rope, reaches an excessive height. The pressure of the outside air will decrease as the balloon rises to ever greater heights, and because of the tendency shown by the gas to expand, there will be a risk of explosion. This is obviated by connecting the valve with a string to the upper wall of the ballonet. As the expanding gas throws the ballonet wall downward, the string will be tightened, thus automatically opening the valve. It may be said that this device has done excellent service in many cases, when the rope had given way.

The adoption of these kite balloons has provided the signal corps of cavalry troops with a means of quickly realizing the situation at the front, substituting for the former chance operations a reliable, accurate, and well-organized service, which is independent even of heavy winds.

At the inauguration of the Milan Exhibition, the German aerostat detachment succeeded in filling and raising its balloon of 600 cubic meters capacity within 25 minutes. The balloon itself served as a motor, being lifted of its own accord by the upward pull of the gas.

The operation of hauling the balloon in, in case the resistance of the arriving wind has to be overcome, will be found far more difficult. For this purpose a roller is generally attached to the rope, and over this a number of ropes reach down, the knots of which are seized by the men, who while running with the wind

sun. In fact, in the case of clear air, the area to be controlled will increase in proportion to the altitude of the point of observation. With the aid of sharp field glasses the various types of ships may be distinguished at distances of upward of 200 kilometers (124 miles). This obviously increases the range of a scout ship equipped with a balloon.

Captive balloons can be used to advantage in locating the positions of submarine boats. It is a well-known fact that we are able to look through clear water to a considerable depth; within certain limits the higher one is placed above the surface of the water, the greater will be the distance that one can see below the surface. The first attempt to utilize this fact in connection with the searching for sunken ships by means of captive balloons was made in Russia as far back as in 1894, when the warship "Russakka" was searched for in the Gulf of Finland. While this first attempt proved a failure, on account of the muddy water, experiments since made at Toulon by the French navy in the beautiful blue-green waters of the Mediterranean have been attended with favorable results.

Because of the ever-increasing use of submarine boats, which are able without being seen to destroy even the largest liners, the importance of this special use of captive balloons will be readily appreciated.

Interesting and most instructive experiments have been recently made in this connection in France on the submarine "Gustave Zédé," which having dived to a depth of 3 meters (10 feet) was allowed to take any submarine course its commander desired, at a normal

As a balloon does not interfere with the speed of the vessel, it therefore should not reduce its range of operation. The gas should, if possible, be generated on board the ship, in generators producing hydrogen through the electrolysis of distilled water.

It may be mentioned that the German antarctic expedition which sailed on board the "Gauss" carried for the purposes of observation a spherical balloon of 380 cubic meters (13,417.8 cubic feet) capacity in addition to a store of 450 steel tanks containing each 36 liters (1.23 cubic foot) of gas under a pressure of 150 atmospheres. At the conclusion of the expedition the remaining steel tanks were inspected, when their gas pressure was found to be 147 to 150 atmospheres, thus showing that during the two years the tanks had been kept on board, no appreciable leakage had taken place, in spite of the considerable differences in temperature to which the tanks had been repeatedly exposed.

Reclaiming Alkali Lands.

Experiments have been conducted by the Department of Agriculture at Fresno, Cal., with a view to reclaiming alkali lands by drainage. Operations are now being conducted in a large vineyard near Fresno, where alkali has come rapidly to the surface. It is hoped that immense tracts which have long lain waste may thus be rendered fertile. There are many thousands of acres of these alkali plains in Fresno County, Cal., which are now useless, but it is believed that their drainage could be easily accomplished through the use of electric power for pumping purposes.