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Table listing sections I through XIII, including Anthropology, Arboriculture, Biography, Botany, Chemistry, Electricity, Horticulture, Mechanical Engineering, Miscellaneous, Physiology and Hygiene, Physics, Social Science, and Technology.

PROF. S. P. LANGLEY'S FLYING MACHINE.

Experiments with Prof. Langley's flying machine have been in progress for some time past, a long series of private trials having been conducted at Quantico, near Washington, D. C. An aluminum body contains the steam boiler and engine by which the machine is driven.

It is unnecessary to say that everything about it is constructed to secure the utmost perfection of operation and lightness. Many trials have been conducted, and, at last, the possibility of flight has been proved. A trial of the machine was made on December 13, and the aeroplane successfully accomplished a flight of three hundred yards.

THE HUDSON RIVER BRIDGE.

The insular situation of New York is one which is destined in the course of time to make it a city of bridges. The East River between New York and Brooklyn has been spanned, and already work is in progress on a second bridge.

Various companies have been organized to bridge the Hudson River, and we have illustrated the proposed structures. The construction of long span bridges has settled definitely into two types, the cantilever and the suspension systems.

It crosses the Firth of Forth at Queensferry, in Scotland, and has two main openings of 1,710 feet span each. It is to be hoped that no structure of this sort will be built here.

The Hudson River, as a navigable stream, is under federal control as far as legislation is concerned. The decision of the Secretary of War in the matter of the construction of a bridge over the Hudson River has been published within the last few days.

We have illustrated two plans of bridges proposed for the purpose in question. One, the great Lillien-dahl suspension bridge (SCIENTIFIC AMERICAN, May 23, 1891), was designed for a span of 2,920 feet, enough to go clear across the water.

The reports state that a single span bridge of either of the above types is safe. The distance between bearings is put at 3,100 feet. A cantilever of this span would cost twice as much as the 2,000 foot one, while a suspension bridge of the larger span would cost but one-third more than the smaller cantilever.

There has long been a species of rivalry between engineers, and even nations, involved in the magnitude of bridges. For a while the United States, with the East

River Bridge, led the world; now Great Britain, with its Forth Bridge, is in the van. When we have a 3,200 foot bridge crossing the Hudson River, we shall probably retain for many a year a proud pre-eminence in this branch of engineering.

When we consider that for the above enormous sum of money six or seven tunnels could be built under the river bed, which would be superior in their operations to a bridge, as they would distribute trains with their passengers along a considerable frontage of the river, and which would be more quickly finished and put in operation, it seems a wrong system to try to raise capital for the construction of the gigantic bridge, destined perhaps never to pay a dividend.

Soft Caps on Conical Projectiles.

It has been proved recently that the penetrating power of conical projectiles may be greatly increased by covering their ends with caps of soft metal. The discovery is one of great importance to naval engineers. It has long been known that hard metal projectiles are likely to be shattered on striking a plate of hard steel, thereby losing much of their force.

The idea of capping the projectiles was suggested by the discovery that if a thin sheet of soft wrought iron be laid over a steel-faced armor plate, the latter failed to shatter a chilled steel projectile which had been fired at it with great force. A similar combination was effected by adding the soft metal to the head of the projectile instead of to the steel armor plate.

A Forest Buried by Alluvial Deposits.

A remarkable instance of the rapid formation of alluvial deposits from overloaded streams has been discovered by the government geological expedition on the Yahtse River, in Alaska. This river in its course from the Chaix Hills to the sea passes through a tunnel in the Malaspina glacier, some 6 or 8 miles in length.

Distribution of Game in the State of Maine.

An interesting report on the distribution of wild game in the State of Maine has been made recently by the State Fish and Game Commissioners. A remarkable increase of large game, such as moose, caribou, and deers, is reported. The number of those who hunt this game has, however, increased fully twenty-five per cent during the year.

#### A New and Successful Treatment of Typhoid Fever.

Some time ago Dr. Hugo Summa, of this city, a thorough physiologist and skillful practitioner, in considering the fact that there is an almost total absence of the usual signs of bile in the feces of patients suffering from typhoid fever, came to the conclusion that possibly some of the distressing features of late typhoid may be due to a deficiency of bile, and determined to try the introduction of ox gall into the lower bowel in well marked cases of the disease. This plan has now been carried out in a considerable number of cases, and with the happiest results thus far, not a single death having occurred when the bile treatment has been instituted; whereas in a similar number of contiguous cases of apparently the same degree of severity the usual fatality has been noted.

The treatment is as follows: Two ounces of fresh bile (which can be obtained at any packing house and kept for two or three days if the air be excluded) may be mixed with from two to eight ounces of water and thrown into the rectum with an ordinary household syringe. Some patients cannot endure the bile of this strength, as it sometimes is quite irritating to the rectal mucous membrane; in which cases as much as fourteen ounces of water must be added to the two ounces of bile. The injection is given every night and morning.

Under the influence of the bile, conjoined with proper feeding, the course of fever has been very favorably modified in instances where the disease was far advanced when the new treatment was begun; in one patient at the City Hospital recovery resulted even after three severe hemorrhages had occurred, and in a large number of cases of typical typhoid in which the treatment was employed before the end of the first week the disease was checked in a very few days.

This is truly a remarkable showing. And if further use of rectal injections of diluted ox gall gives the same results as those already obtained in the hospitals of St. Louis, Dr. Summa will have given us a remedy second in importance to the recent cure for diphtheria. Full details of the treatment and results will be published as soon as its efficacy has been thoroughly tested.—St. Louis Clinique.

#### How to Buy a Horse.

An old horseman says: If you want to buy a horse, don't believe your own brother. Take no man's word for it. Your eye is your market. Don't buy a horse in harness. Unhitch him and take everything off but his halter, and lead him around. If he has a corn or is stiff, or has any failing, you can see it. Let him go himself a way, and if he walks right into anything, you know that he is blind. No matter how clear and bright his eyes are, he can't see any more than a bat. Back him, too. Some horses show their weaknesses or tricks in that way when they don't in any other. But, be as smart as you can, you'll get caught sometimes. Even the expert gets stuck. A horse may look ever so nice and go a great pace, and yet have fits. There isn't a man who could tell it until something happens. Or he may have a weak back. Give him the whip and off he goes for a mile or two, then all of a sudden he stops on the road. After a rest he starts again, but he soon stops for good, and nothing but a derrick can start him. The weak points about a horse can better be discovered while standing than while moving. If he is sound, he will stand firmly and squarely on his limbs without moving them, with legs plumb and naturally poised; or if the foot is taken from the ground, and the weight taken from it, disease may be suspected, or, at least, tenderness, which is the precursor of disease. If a horse stands with his feet spread apart or straddles with his hind legs, there is a weakness in his loins and the kidneys are disordered. Heavy pulling bends the knees. Bluish, milky cast eyes in horses indicate moon blindness or something else. A bad tempered one keeps his ears thrown back; a stumbling horse has blebbed knees. When the skin is rough and harsh and does not move easily to the touch, the horse is a heavy eater and digestion bad. Never buy a horse whose breathing organs are at all impaired. Place your ear at the heart, and if a wheezing sound is heard, it is an indication of trouble.

#### Annual Report on the Ocean Postal Service.

During the past year the international sea post offices have been in continuous operations upon the fast steamers of the North German Lloyd line, the Hamburg-American Packet Company, and on the Paris and New York of the International Navigation Company. In all 147 trips have been made from Europe and 144 from New York. The mails are always dispatched by the fastest steamers, and when two fast steamers sail on the same day the mails are intrusted to the one whose records lead the postal authorities to believe will be the first to reach her destination. Other things being equal, however, the steamers sailing under the flag of the United States are given the preference. The steamers are paid for their services the amount of the postage collected on all the mail matter they carry from this country. The system has been perfectly satisfactory to all parties during the past year.

#### What Oculists in This City and in Chicago Say About Defective Eyes.

"About forty per cent of the people need to wear glasses nowadays," said a New York optician to a Mail and Express reporter. "But not all these people wear them. Four people in ten have some trouble with their eyes. It may be near sightedness, it may be simply weakness, it may be an inequality between the eyes; but whatever it is, there is a way to help it with glasses.

"A great many people have trouble with their eyes and do not know what it is; they attribute it to overwork of the eye sometimes, and sometimes lay it to headache or neuralgia, while it is merely the protest of a defective eye, that has been forced by will power to do work beyond its strength, or to keep up with the other eye.

"But people are learning now to take care of their eyes, and resort to artificial aid more promptly than previous generations did. A proof of it is the number of young people and little children who are wearing glasses. This does not at all indicate that the race is growing degenerate, but simply that it is learning to take care of itself, and these children in glasses will grow up to have better vision, that will also last them longer for it.

"It often happens, too, that children's eyes are cured of imperfections by glasses worn at an early age. The lens enables the eye to work normally, and a fault in formation sometimes is entirely remedied by it, and the child in later years is able to dispense with glasses altogether."

According to the statement of a Chicago optician, as many as nine out of every ten persons have something wrong with their eyes. Black eyes and brown eyes and blue eyes are all afflicted to about the same degree, unless it be that blue eyes are troubled with near sightedness a little more frequently than those of darker hue.

The troubles commonest with children and young people are myopia or near sightedness and hyperopia or far sightedness, and the latter predominates. But many are far sighted who are not conscious of it, and hence the trouble is seemingly less common than near sightedness, which is made apparent by the person so afflicted endeavoring to overcome the defect of vision by holding the object close to the eye.

#### HOW DEFECTS MAY ARISE.

The Chicago Journal says that near sightedness and far sightedness result from the improper focusing of the object by the lens of the eye on the optic nerve. The focal point falls before or back of the nerve center, and thus by an additional lens the defect of the lens of the eye is corrected. Sometimes but one of the eyes is defective, and again they are impaired in different degrees, and in either case a pair of spectacles in which the lenses are of the same power will not remove, but may increase the trouble.

By far the commonest defect of the eye is what is known as astigmatism, which, properly speaking, is the irregular curvature of the cornea or "watch crystal" portion of the eye. This defect may exist independently or be combined with other troubles.

Astigmatism may be of a vertical or horizontal form—that is, the eye may be perfectly rounded from top to bottom, but irregularly formed from side to side. To such an eye a perpendicular line would appear uniformly clear and distinct, while a horizontal line would look otherwise. By pasting black strips of paper representing the spokes of a wheel on a white surface and viewing them from varying distances, with either eye and both eyes at a time, any one can learn something of the condition of his or her eyes. As a matter of course, oculists all have various charts for determining defects of the eyes.

#### NATURAL IMPAIRMENT OF SIGHT.

The natural impairment of vision by age usually begins at 40 or 45. Any unusual trouble with the eyes during youth may cause the decay of sight to set in earlier, but ordinarily the impairment is uniformly regular, and the age of the person is the chief guide in the selection of proper spectacles.

The marvelous stories of "second sight" are misleading. What is known as "second sight" is the result of a change in the form of the eye by which the defect which caused near sightedness or far sightedness is corrected and the sight thereby improved. But the second sight is not the regaining of a lost power, but means the coming into the fuller possession of a function that in earlier years existed in an impaired condition. This is why persons who have been accustomed to wearing spectacles sometimes lay them aside in advanced years or old age.

It is probable that the sands of the seashore will be numbered and the leaves of the trees correctly counted about as soon as will be ascertained the number of cases of headache caused by nerve irritation arising from defects of vision. The stomach has had to endure a world of bitter medicine to remove troubles for which the eyes were wholly to blame. But it is easier to swallow any concoction that may be handy than it is to make an exhaustive study of the optic nerves

and their remarkable influence on the health of the whole system. It is easier and cheaper to snuff camphor or smelling salts than it is to be examined for a pair of spectacles.

#### CURING "CROSS EYES."

Strabismus or "cross eyes" are now safely and almost painlessly corrected. The desired result may be obtained by the wearing of proper spectacles in early youth, but if the evil is not then corrected, an operation, later on, will be necessary.

The removal of a "cataract" from the eye is one of the most delicate operations performed by the oculist. A cataract is formed by the lens of the eye becoming opaque so as to appear grayish or otherwise, when it shuts out the light from the optic nerve. The oculist of to-day cuts into the ball of the eye and removes the darkened lens, and the optician supplies the defect by artificial lenses that make good the sight.

The demand for glass eyes is increasing as the character and quality of the eyes improve. Unsightly eye balls are now removed in part, leaving enough of the muscles to rotate the glass shell that is placed over them. Where the work is properly done the possessor of the glass eye can move it about with all the naturalness of a real optic, and in many cases it is very difficult to tell the manufactured article from the genuine.

All the wild stories about substituting rabbits' eyes for human eyes, or the statements to the effect that oculists can take eyes from their sockets, wipe them on a coarse towel and restore them unimpaired to the happy patient, are all moonshine, and any one who is called upon to listen to any such tales is perfectly justified if, under such circumstances, he should wink the other eye.

#### Dry Dock at Port Orchard.

The great dry dock at Port Orchard, Washington, now in course of construction, will be the second largest dry dock in the world, and in its general equipment one of the most valuable of such naval stations. A large tract of land on Puget Sound, 16 miles from Seattle, has been bought for the purpose and the work of building is well under way. It is to be equipped with a timber and concrete dock, 675 feet long, with a floor width of 67 feet. Its greatest width will be 130 feet and its depth 40 feet. The cost of construction will be \$608,000, and it is stipulated in the contract that the dock shall be completed within three years.

The dock is being built in accordance with the latest knowledge in the construction of dry docks. The dock will be closed by a gate or caisson built in the form of a ship with a hull and a bow at either end. This will be constructed of iron. Its dimensions will be 91 feet in length, extreme breadth 24 feet, and a height of 38 feet from bottom of keel to top of waterway. The gate is pierced by twelve 20 inch filling culverts, each fitted with a gate valve. For emptying the dock, three powerful centrifugal pumps are provided, each of which is operated by a separate engine. In addition to this there will be a fourth centrifugal drainage pump. The steam for operating the pumps will be supplied by six large steel tubular boilers. The boiler pressure will be 100 pounds to the square inch, and the pumps will be capable of discharging 110,000 gallons of water per minute.

The gate is, however, the most interesting feature of the dock. The upper part is supplied with a water compartment provided with two 20 inch sluices, one of which opens into the sea and one into the dry dock. The gate is closed by filling this compartment with water and sinking it, the water being admitted through two 20 inch valves. When the gate is to be raised or floated, this water is pumped out. The main deck is supplied with a boiler and engine to drive a small centrifugal pump, capable of delivering 2,500 gallons per minute. The gate is handled by the aid of a capstan placed at the center of the upper deck and worked by a vertical shaft from the engine on the lower deck.

#### Test of the Gordon Gun Carriage.

The official test of the new Gordon gun carriage was made recently at Sandy Hook with very gratifying results. The contract called for the firing of ten shots an hour and offered a bonus of \$2,000 for each shot beyond ten. In the test thirty-two shots were fired in an hour, thus making a bonus of \$44,000 for the company. The carriage differs from those previously tested. It is built on a platform with a central pintle, and can be moved about in a circle. This is the only carriage for 10 inch rifles which can be moved in this way. When in position for firing it is 20 feet from the ground, and after firing it drops 8 feet to the loading position. It is supplied with two electric motors, one being used to pump the air for raising the carriage and the other for swinging the gun about on its pintle. The recoil is taken up partially by air pressure and partially by counterweights. The counterweights are placed beside the gun, thus providing some protection for the gun and the firing squad. The movements of the carriage may be controlled either by hand or by electricity.