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THE NEW SOUTH.

In the current number of the SUPPLEMENT will be found the digest of a lecture recently delivered by Mr. Carroll D. Wright on "The New Industrial South." The lecture, as was natural, dealt largely with statistics, and statistics are ordinarily dry reading; but in this case, as Mr. Wright justly observed, "figures are more eloquent, when dealing with industrial affairs, than any other form of expression. They give in concrete form the results of great enterprises; they crystallize the moving history of the time."

This "moving history" has been a truly remarkable one, and in some respects unparalleled in the history of the world. In its opening chapters we find a country drained of its resources, and its people decimated by a succession of the most sanguinary battles of modern times. The emancipation of the slaves had torn the social fabric of the South asunder. The very foundation stones upon which its social and political economy had been built were swept away. The patriarchal life of the plantation was gone for ever; and when the survivors of the war came back and hung up the saber and the rifle upon the wall, they sat down in the solitude of their deserted homes to think out a new problem of existence. The outlook was as dark as could well be conceived. With its treasury exhausted, its credit gone, the flower of its manhood cut off by war and lost in the oblivion of scattered and nameless graves, with its industries paralyzed, its cities ruined, and its fair lands a wilderness of desolation—truly this country was as piteous a spectacle as was ever left in the track of a long and bitter war.

In those first years of convalescence, the Southern people began dimly to see the truth, which now in the day of their industrial triumph is clearly manifest, namely, that the fundamental idea of the old plantation life was false in itself and fatal to the industrial and social development of the country. Had it not been for the upheaval of the war, it is likely that the South of to-day would have been in very much the same condition as it was in the antebellum days. Labor, as represented in the negro, would have been perfectly content to remain in a state of childish ignorance and simplicity; and capital, as represented in the planters, would have continued indolently to spread its lap to receive the lavish contributions of a soil of unusual fertility. In such a life there was neither incentive nor opportunity for that industrial activity which at once enriches the treasury and builds up the character of a people. In the broad division of the people into the two classes of masters and slaves there was no provision for those gradations which seem to be inseparable from a successful social economy; and so there was developed a species of nondescript unfortunate, known as the "poor white."

Before the war, and for many years after it, a landed aristocracy did but little to encourage the inflow of capital and industrial enterprise from the outside world; and to this may be largely attributed the stagnation which marked the first fifteen years of the latter period. Partly because she made no effort to attract it, and partly because it was so steadily and artificially guided to the Western and Northwestern States, the tide of immigration set steadily past the Southern country; and while the barren lands and virgin forests of the West have been peopled with the best elements of European immigration, much of the fertile land of the South has lain idle for want of a husbandman.

Happily for this country, however, there was a section of the older men of the South which, aided by the younger and progressive generation, was equal to the task of translating the lessons of the war into vigorous and aggressive action. To them is due the development of the hitherto neglected, but wonderfully varied and plentiful, mineral wealth of the country. Capital was invited to enter, and to the immigrant, who hitherto had looked with distrust upon the land of great plantations, underpaid labor, and "poor whites," there was extended the right hand of fellowship and the offer of rich farming land at remarkably low figures. At the same time, the racial question was taken in hand and treated in a generous spirit. It was realized that the negro was in the South to stay; and that the only possible way to better his condition was to give him the full benefit of the noble creed which teaches that "all men are created equal." The success of this more enlightened treatment of the negro depends upon its intelligent and discriminating application. As Mr. Wright very pointedly put it: "Philanthropy cannot make a negro into a Circassian. We should endeavor to make out of him as good a negro as possible, and so educate him along industrial lines that he will become a valuable economic factor." The spirit displayed by the promoters of the Atlanta Exposition in regard to the negro showed with what practical common sense the question is now being treated. An exhibit devoted to the products of colored labor was housed in a building specially erected for the purpose; and the once despised race saw their own spokesman rivaling the eloquence of the distinguished orators of the day upon a common platform.

To any one who has had the opportunity to travel through the Southern States and take note of her natural resources, the statistics of her industrial development during the last decade are full of promise.

In a certain sense her agricultural development has only just begun. Large as is the cotton crop, it only represents a fraction of the productive powers of the soil. At present the South is a one-crop country, and therefore is subject to distressing extremes of fortune. A more varied agriculture would at once make her richer and financially more stable. This will come with the division of the large plantations, or a portion of them, into smaller farms, and the settlement of these farms by hardy and energetic immigrants from the Northern and Western States. This immigration is now taking place, and it is growing in volume. It would seem as though the West had now been pretty fully exploited; and that the advice to the intending emigrant would henceforth be, for a time at least, "Go South."

THE APRIL SKY.

BY GARRETT P. SERVISS.

The two greatest planets, Jupiter and Saturn, are well situated for observation this month. While Jupiter is slowly sinking in the west, Saturn is rising in the east, and, between 10 and 11 o'clock at night, the observer, with a small telescope, may turn alternately from the belted to the ringed planet and enjoy the striking contrast between them. In comparison with the wealth of detail and brilliant colors exhibited by Jupiter, the globe of Saturn appears dull and uninteresting, but its marvelous rings furnish a spectacular element that more than suffices to counterbalance the attraction of Jupiter's cloud-spotted disk.

Jupiter is in the constellation Cancer, moving slowly eastward. It rises in the middle of the day and is well situated, west of the meridian, during the entire evening. It is better to begin the observation of it with telescopes not later than 8 or 9 o'clock, when it is near its greatest elevation.

Saturn is in Libra, a little east of the star α. It becomes well elevated in the southeast by 10 o'clock P. M.

Mercury, which is in Pisces at the beginning of April and in Taurus at the end, is too near the sun to be observed. It passes behind the sun on the 17th, emerging afterward into the evening sky, where it will become visible in May.

Venus is also too near the sun for convenient observation, although early risers may catch sight of it before sunrise in the constellation Aquarius, from which, in the course of the month, it will move eastward into Pisces.

Mars also is an early morning star, being situated at the opening of the month in the eastern part of Capricorn and at the end in Aquarius, still nearer the sun.

Uranus is in Libra, six or seven degrees southeast of Saturn, and Neptune is in Taurus, near the star ι.

The moon passes the planets in the following order: Mars, in the morning of the 8th; Venus, in the evening of the 10th; Mercury, in the afternoon of the 12th; Neptune, in the morning of the 17th; Jupiter, in the afternoon of the 20th; Saturn, in the morning of the 28th; and Uranus near midnight of the same date.

At the time of the conjunction with Jupiter, on the 20th, the moon will be near first quarter, and the conjunction will occur a little more than half way from the eastern horizon to the meridian. If the sky is clear, it should be possible to find the moon easily with the naked eye. A telescope directed to the moon at about 3 P. M., and swept carefully toward the south, will enable the observer to pick up Jupiter by daylight—a very interesting observation for an amateur. The planet, at that hour, will be about two degrees from the moon, in a southerly direction.

New moon this mouth occurs about 20 minutes after 11 o'clock on the night of the 12th; first quarter about 15 minutes before 6 o'clock in the evening of the 20th; full moon at 8:47 A. M. on the 27th, and last quarter (the last of the preceding month's moon) at 7:24 P. M. on the 4th.

The moon will be in apogee in the night of the 10th and in perigee in the morning of the 25th.

Jupiter's satellites will present an interesting series of phenomena on the night of the 15th. Before 7:19 P. M., Satellite II will be crossing the planet's disk, moving off the western edge at the time mentioned. At 9:17 P. M. Satellite I, which will previously have been observed drawing near to the eastern edge of Jupiter, will pass upon the disk. At 9:50 P. M. the shadow of Satellite II, which will have been upon the face of the planet since about 7 o'clock, will pass off the western edge. At 10:34 P. M. the shadow of Satellite I will appear on the eastern side of the disk, the satellite itself being at that time about half way across. At 11:37 P. M. Satellite I will pass off the western edge, and one hour and seventeen minutes later its shadow will follow it off the disk.

The starry heavens are very attractive in April. Between 9 and 10 P. M., about the middle of the month, Sirius is flashing near the western horizon while the brilliant Vega is rising in the northeast.

Nearly overhead shines the Great Dipper, and south of it appears the softly twinkling Berenice's Hair. East of the latter is Arcturus, a royal star in brightness and color, while between Arcturus and Vega glitters the pure white Spica in the constellation of the Virgin.

Among the easily observed double stars now favorably placed are γ Virginis, ε Boötis, Mizar in the middle of the Dipper's handle, γ Leonis, and Castor, the great double in Gemini.

THE CONTEST BETWEEN SHOT AND ARMOR.

At the present writing it looks as though the superiority of shot over armor was proved, and that unless some new method of treating the plate be devised, the gun will have the armor at its mercy. That is to say, it will at the proving grounds; whether the hazard and confusion of a sea fight will very often afford the ideal conditions for penetration is open to question. The twelve inch side armor of the two Chinese battleships, which bore the brunt of the Japanese attack at the Yalu, was struck repeatedly; and yet no shot made a deeper penetration than four inches, although the three leading Japanese ships were armed with a gun—the 66 ton Canet rifle—which was credited with the highest power of penetration of any in the world. It is certain that, during the many hours that the fight lasted, some of the shots from these big guns must have struck the armored portions of the Ting Yuen and Chen Yuen. Judged by proving ground results, any one of these shots should have easily penetrated the belt, and wrecked the "vitals" of the enemy.

Now all this goes to show that the gun versus armor contest must not be judged from the results at the target alone. In target firing the gun has everything in its favor. The range is accurately known; the target is stationary; and the shot is delivered normal to the face of the plate. In a sea fight the range is uncertain; the target is moving; and the face of the armor will very seldom be struck squarely by the shot—this last being an element in favor of the armor of greater value than is generally supposed. To this, we think, more than to any other cause, must be attributed the surprising powers of resistance shown by the out-of-date armor plates of the Chen Yuen and her mate.

The history of the development of armor plate dates from the Crimean war and the war of the rebellion. In its earlier stages, the advantage lay with the armor. Penetration was comparatively rare; and in the attacks upon the Russian forts in the Black Sea, and upon the Southern batteries, the side armored vessels proved comparatively invulnerable to the round shot and shell of that date. The gun crews on the floating batteries suffered, as a rule, no greater inconvenience than the rattle of the round shot as it fell harmlessly from the iron plated sides of the vessel. Even the great 15-inch shot from the Rodman smooth bores could not get through. For a while, iron armor held the field. Then came the so-called conical shot, the long rifled gun, and the resulting increase in velocity; in the presence of which the thin plates of iron proved to be helpless.

Armor plate makers tried the next natural expedient, and made the plates thicker; and, as these plates were successively penetrated, they kept adding to the thickness until, in 1881, when the British Inflexible was floated, she carried no less than two feet of solid iron upon her sides. Difficulties of manufacture and the excessive weight of such armor led to the adoption of steel in place of iron. Here, however, the brittle nature of the steel presented a difficulty, and an attempt was made to combine the hardness of steel and the toughness of iron in what is known as the compound plate. This consists of a plate which is made up of an extremely hard steel face upon a softer iron backing. The idea of this device was that the steel face would provide the resistance to penetration; and that the iron backing, upon which the steel was welded, would prevent the steel from cracking; or, should it be cracked, it would keep it from falling to pieces.

The theory was plausible; but the results obtained in trial have been very disappointing; the steel face cracking and flaking off from the backing in most alarming fashion. The failure of the compound plate left the field open to the "all steel" advocates, and for the manufacture of a perfect plate there was only wanting some process by which the steel could be toughened without losing any of its hardness. This process was found in the nickel steel armor, in which the introduction of a proper percentage of nickel gave a remarkable toughness to the steel, without impairing its resisting powers. Shots were put through the test plates without producing those radiating cracks which at the second or third penetration had resulted in complete demolition.

Meanwhile the gunmaker had not been idle. Increased length and smokeless powders resulted in increased velocities; the penetration per ton of gun grew steadily larger; and the thickest steel plates succumbed to a caliber of gun which a few years before would never have been thought of as capable of piercing heavy armor.

The victory now lay with the gun.

It was reserved for an American inventor, whose name will forever be famous in the annals of the armor plate industry, to introduce a process which turned the tables entirely, and placed the advantage strongly on the side of the plate. The Harvey process, which is named after the inventor, seeks to present intense hardness of face, rather than thickness of metal, to the shot. The inventor realized that it was useless to attempt to resist the enormous momentum of modern ordnance; and that the only way to meet that momentum was to break up the material of the shot at the moment of impact. This he accomplished by making the face intensely hard, so hard, indeed, that it was capable of cutting glass. The Harveyized plates were a success from the very first. Shots which theoretically should have easily passed through a plate flew to fragments at the moment of impact.

For some few years the new plates remained practically impregnable against the hardest projectiles. Various systems of shot hardening have been tried, but with limited success; and it is only within the past few months that the gun makers have been able to regain their old ascendency. The first whispers of successful penetration came from Russia, where shot, which had been made on a "secret process," were reported to have passed through Harveyized plates without breaking up. What the process was can only be surmised; but the recent remarkable tests at the United States proving grounds at Indian Head make it probable that some form of what is known as the "soft steel cap" was used on the projectiles.

In these tests, and also the tests at the same grounds last October, the successful shot were "capped," that is to say, the point of the projectile was covered with a soft steel cap. The theory of this device is that when the point of the shot strikes the plate it will be prevented from flying apart by the surrounding metal of the cap. When the point has once entered the hard face of the armor, it is held together by the metal of the plate itself, and the shot can then expend the energy of its unbroken mass upon the body of the plate.

In the experiments of October last a Harveyized plate, which had broken up the ordinary 6 inch shot, was cleanly perforated by four 6 inch capped shot. The experiments now in progress with heavier 8 inch and 12 inch shot will be watched with keen interest, and thus the final advantage seems to lie with the gun.

Roentgen Photography.

In a recent Franklin Institute paper, Drs. Edwin J. Houston and A. E. Kennelly gave the following directions for using the ordinary alternating lighting current for X ray work. To the primary terminals of an induction coil are connected leads from a 50 volt alternating current circuit. The secondary of the induction coil connects with a battery of Leyden jars and with the primary of the Tesla coil. The Tesla coil is made by winding about 80 turns of No. 19 cotton covered wire on a glass tube about ¾ inch in diameter. Over this is passed a slightly larger glass tube wound with about 400 turns of No. 31 silk covered wire. The whole is immersed in a jar of resin oil. The Crookes tube is connected to the secondary of the Tesla coil. This arrangement gives the disruptive discharge, which is of increased effect and less likely to injure the tubes. The discharging electrodes of the induction coil are placed about 5 mm. (0·2 inch) apart. To secure sharp images the use of a metal plate perforated and used as a diaphragm is recommended.

Nikola Tesla has continued his experiments on reflection of X rays from different materials, using an angle of incidence of 45° as the most crucial test. Each sample was tried simultaneously as to its power of reflecting and transmitting the incident ray. Zinc, mica, tin and lead were the best reflectors. Aluminum reflected no appreciable portion of incident rays. There was no corresponding order in transparency to the rays. Zinc, tin and lead proved opaque; mica transparent. He upholds as his view that the X rays are both cathodic and anodic. He has obtained good results by using a zinc reflector for his tubes. He announces that he has not found the least evidence of refraction.

MM. Darieu and De Rochas have tested an eye, which was placed upon a plate holder with two fingers beside it. The X rays were then produced and a photograph taken. The eye proved intermediate in opacity between bone and muscular tissue. The rays passed axially through it.

A very interesting line of work has been initiated by Mr. H. I. Dreschfield, L.D S., of Manchester. He used X ray photography to show the development of the second set of teeth in a living subject, a boy about thirteen years old. He succeeded in obtaining a photograph showing the first set of teeth in place and the second set still in situ in the bone back of and above the others.

It is definitely stated that X rays were used in Vienna to determine whether a wrapped mummy contained the remains of an ibis or of a human being. The process showed it to be the mummy of an ibis.

A very ingenious attempt to measure the intensity of the X rays is due to Prof. R A. Fessenden and Prof. James Keeler, Western University, Pittsburg, Pa. They immerse the ends of two terminals of a circuit in paraffin, the ends being about one-half inch apart. The X rays are then caused to pass through the paraffin and their effect in causing an electric discharge to pass is used as a measure of their intensity.

Prof. Rowland, of Johns Hopkins University, and Elihu Thomson both appear as enunciators and upholders of the hypothesis that X rays are of the anodic order, and not of the cathodic order. Thomson found that no X ray effect could be obtained from an excited tube when the anode and a fluorescent screen had a patch of opaque metal interposed upon the glass of the tube between them, although the cathode was unscreened. Anode rays he found to be erratic in distribution from the anode, and to require very high exhaustion for their production. He says that it is fortunate for science that the Crookes tube used by Roentgen had a high enough vacuum to give anodic rays.

Cost of Bad Roads.

According to statistics collected by the office of Road Inquiry of the Department of Agriculture, the amount of loss each year by bad roads of the country is almost beyond belief. Some 10,000 letters of inquiry were sent to intelligent and reliable farmers throughout the country, and returns were obtained from about 1,200 counties, giving the average length of haul in miles from farms to markets and shipping points, the average weight of load hauled and the average length per ton for the whole length of haul. Summarized, it appears that the general average length of haul is twelve miles, the weight of load for two horses 2,002 pounds, and the average cost per ton per mile 25 cents, or $3 for the entire load.

Allowing conservative estimates for tonnage of all kinds carried over public roads, the aggregate expense of this transportation is figured at $946,414,600 per annum. Those in a position to judge calculate that two-thirds of this, or nearly $631,000,000, could be saved if the roads were in reasonably good condition. At $4,000 per mile a very good road can be constructed, and if an amount equaling the savings of one year were applied to improving highways, 157,000 miles of road in this country could be put in condition. The effect of this would be a permanent improvement, and not only would the farmer be astonished in the sudden reduction in his road tax, but he would also wonder at the remarkable falling off in the cost of transportation. He would also find that he required fewer horses and less feed for them. He could make two trips to market a day instead of one, when ability to get his goods there at a time when high prices are ruling is a matter of great consequence. Farmers are beginning to apply a little simple arithmetic to some of these matters, and it is not too much to expect that in the near future we shall see a decided revolution in the condition of our rural highways.—New York Recorder.

Value of Farm Animals.

According to statistics published by the Department of Agriculture at Washington, says the Iron Age, the aggregate value of farm animals in the United States has declined very materially in recent years. At the present time the value of these animals is $755,580,597 less than it was in 1893. The decline is more particularly observable in the case of horses. Taking the seven years from 1890 to 1896, it is shown that horses increased in number until 1893. In 1892, however, their value began to fall off, and in 1895 it was not quite half that of 1892, showing an aggregate decline in this respect of about $500,000,000. This depreciation is attributed in the main to the introduction of trolley cars and bicycles. The high cost of fodder, however, after recent seasons of drought, is also given as a contributing cause. The value of mules since 1890 has fallen nearly $80,000,000, or not far from half the total existing value of these animals in the United States. On the other hand, milch cows have increased in numbers, while the average value of these animals has advanced steadily within the past few years. The increase in the value of milch cows last year, as compared with 1894, is $1,300,000. Oxen and other cattle decreased in numbers more than 2,000,000 in 1895, while their value increased on an average $1.80 a head in the same period. A decline is noted in the numbers and value of sheep in the last three years, the decrease in value aggregating about $60,000,000 and the falling off in numbers of these animals last year being nearly 4,000,000. Swine, in 1895, declined 3 per cent in number and 15 per cent in aggregate value, the total decrease in the value of swine in 1895 being nearly $33,000,000. It is expected, however, that the enormous corn crop of last year will have a favorable effect upon the next statement of farm animals, the tendency to an increase in numbers and value being already observable.