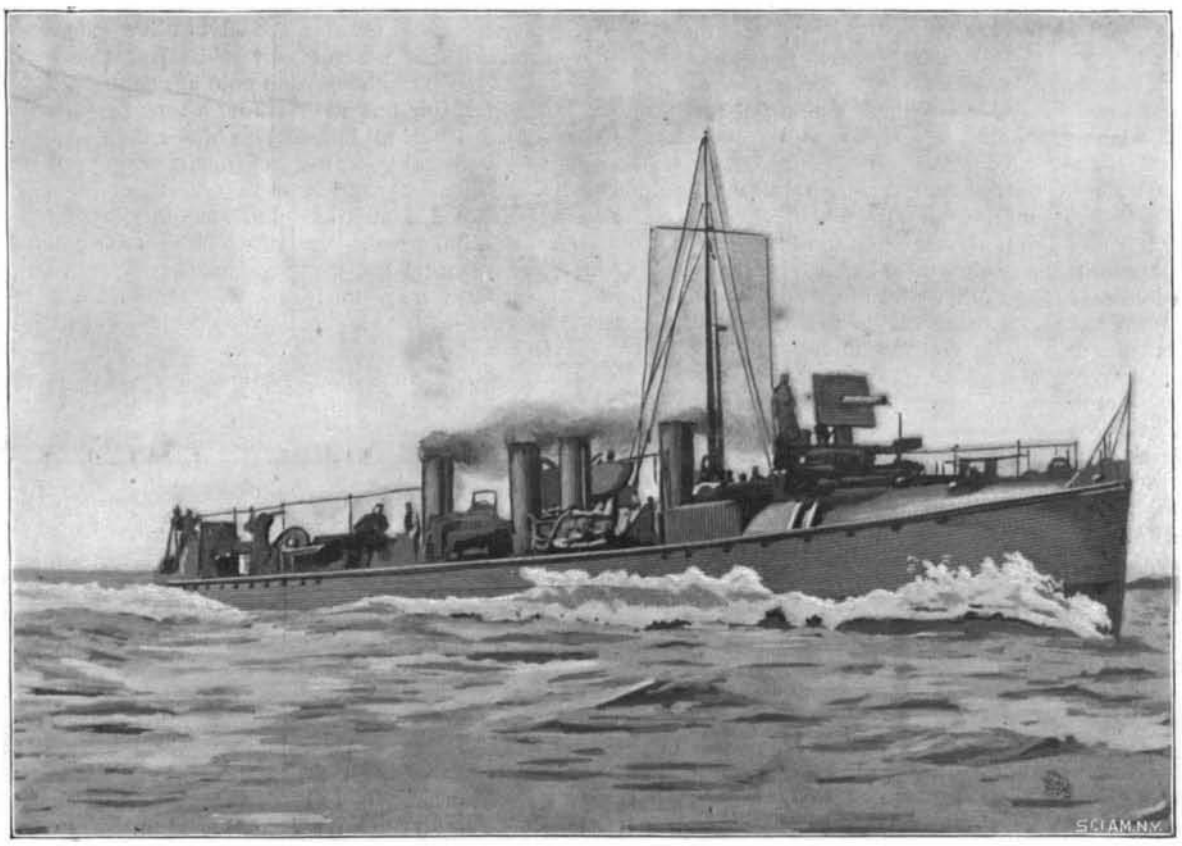
THE RUSSIAN TORPEDO BOAT DESTROYER SOKOL.

Thirty knots an hour has been the mark which the builders of torpedo craft and swift river launches have, of late years, been striving to reach. The torpedo boat destroyer Sokol was the first boat to win this coveted distinction; and the accompanying illustration shows her as she appeared on the measured mile, when running at the rate of 30¼ knots, which is equal to about 35 miles an hour.

The Sokol was built for the Russian government by Yarrow & Company, of Poplar, London. She belongs to a class of boats which were built as an answer to the torpedo boat proper. Their duty is to give chase to, run down and destroy, these small craft; and for this purpose, the destroyer is given larger dimensions, higher speed, and a powerful battery of rapid-fire guns. The Sokol is 190 feet long by 18 feet 6 inches beam. Her horse power for her size is enormous, being about 4,000; and it shows at what great cost these high speeds are obtained. She is twin-screw, and her engines are of the three-stage, compound type, that the builders use in this type of vessel. Steam is supplied from eight water tube boilers.

The high speed of the Sokol is not due to the horse power alone—great as this is—but it is in large measure owing to careful attention to detail in the construction of the hull and machinery. Wherever it was possible to save a pound of weight it has been done. The hull is built of nickel steel, a material which is more rigid and possesses greater strength than the customary mild steel of ship construction. In the fittings of the hull aluminum has been used wherever great strength is not required; and weight has been saved in the engines by using high class bronzes, which have a high unit of strength for their weight.

In the endeavor to get the highest possible speed on a given displacement, the torpedo boat builder has exercised a powerful influence on naval design in general. It is doubtless largely owing to his experience as a builder of torpedo boats and swift launches that Mr. Herreshoff holds the first place as a designer of swift sailing yachts.



THE RUSSIAN TORPEDO BOAT DESTROYER SOKOL.

The Ruined Gila Cities.

The attention of people interested in archæology and ethnology generally has long been directed to the ruins of the cliff dwellings in northern Arizona and southern Colorado, but there are comparatively few persons outside of Arizona and New Mexico who know that in southern Arizona there is a field far more interesting and of wider range. So eminent authority as Major J. W. Powell, recently of the United States Geological Survey, is quoted in support of this statement. Conservative estimates put the population of the Gila country at fully 2,000,000 when it was at its height.

The Gila remains have been but little explored because of the inaccessibility of the region, the intolerable dry heat during two-thirds of each year, and the total lack of water where it is needed. The mining prospectors who have tramped for years over all the mountains and through every valley in the Territory have given no heed to this part of the Gila country, because, no water being there, it would be useless to attempt to develop a mine even on good surface indications. An expedition under Frank Cushing did some work near Los Muertos, which is known in the Southwest as the Pompeii of Arizona, but with the breaking down of his health the enterprise came to an end. The area of the country in which the remains of a prehistoric people are found is some 300 square miles. It extends from the junction of the Gila and Colorado Rivers eastward to the Superstition Mountains, and from Phœnix on the north almost to the Mexican line. Near Casa Grande the most extensive Indian remains are to be found.

The country is a ruin from one end to the other. All parts of it bear unmistakable evidences of irrigation canals several hundred miles long and built with exactness and skill, and of cities of 30,000 and 40,000 population. One can walk for miles and find every foot of the sandy surface more or less mixed with pieces of broken pottery. The paint is still on them, and is not in the least faded, though it has lain exposed for ages. In the locality of Mesa City and Tempe an overflow from the Gila at some distant period washed against the ruins until they crumbled and were spread out level with the country. Back ten miles from the Gila River the ground is higher, and was once the site of a city. Portions of the wall by which it was protected are still standing, more than twenty feet in thickness. Inside are the mound like ruins of the houses, which, being less durable, have crumbled. The buildings must have been very large, for in some instances the mounds are 300 feet in length by 200 in width and 20 in height. The space inclosed by the wall is about fifty miles by three. Much of the country is very little higher than the present bed of the Gila, and at one time a branch of that stream must have flowed into a basin and formed a natural reservoir. There was a rise of about ten feet greater at one point between the basin and the river, and the sandstone formation shows unmistakable signs of having been cut by artificial means, perhaps with the idea of assisting the entrance of the water by enlarging the passage. Five canals lead out of the basin, all on the south and west, which confirms the belief that it was once a reservoir formed chiefly by natural causes, and used to store water against the periods of drought. The prehistoric city is laid out north and south, at least, in a majority of instances the streets run to the cardinal points. The walls seem to vary a little from this rule; in fact, are crooked in places, as if they might have been constructed for the support of bastions or towers. This city and the one containing an old fort further down the river are the only ones in which the writer ever found any evidence of preparation for war. It seems as if the races who lived in this Gila country were either so numerous that they feared no attack or they had no enemies with which to contend. South of Phœnix, on the mesa, are the ruined corrals or stock pens in which their animals were kept. Many finds prove the purpose for which they were used. What the animals were is not so easily determined. On slats found in ruins south of the Salt River are splendid figures of llamas. In the ruins that have best withstood the exposure of the ages many interesting specimens of the ceramic art have been found. Ollas of all shapes and sizes, urns containing the ashes of the dead, and jars partly filled with parched corn and beans are found in a remarkable state of preservation. It seems as if the entire city had been swept by a flood and the earthen house melted down, or they were shaken by an earthquake and toppled into a thousand fragments, giving the inhabitants barely time to escape. Few of the skeletons that the amateur diggers in the ruins have taken out show signs of mutilation or have broken bones. The people appear to have died of suffocation or some natural cause that left no mark upon the frame. In working in several spots where bones have been found deeper digging has brought to light large quantities of bone dust as fine and light as gunpowder. In one spot near Tempe, several tons of bone dust have been found recently, lying in what appears to have once been a trench some seventy feet long and two deep, nine feet below the surface of the sun-baked earth. The edges of the deposit of bone dust were broken and uneven, so that it could not mark a place of burial. Does it consist of the remains of animals or is the dust that of human beings? If the latter, was it the result of funeral rites, or were the bodies deposited there by some great flood that came over the land without a warning? The majority of the skeletons discovered in the Gila Valley are in good condition, and it is therefore not easy to reconcile this fact with the finding of the great deposits of bone dust.—New York Sun.

An American on the British Empire.

The Hon. Justice Field, of the United States Supreme Court, recently passed through Canada, and a long account of an interview with him appears in the Montreal Daily Witness. In reply to a remark by the correspondent, who observed, "You have beaten us in the race for population," the judge said, "There were special causes for that. But you are bound to prosper. Greatness will come in time. It always does where England plants her foot; and that not because of her might, but for a nobler reason. Wherever England plants her foot she at once establishes order; she makes laws; she protects life and property. And those who place themselves under that flag stay under it, assured that they can sit under their own vine and fig tree. That is the secret of the British Empire—that it stands for order, for the sacredness of human life, for protection of every interest, however humble. You have a great country and are part of a mighty empire. When I think of Australia, New Zealand, South Africa, India and this great country to the north of us, I am filled with wonder." "Do you think this unwieldy empire will last?" "Justice and righteousness will make it last," replied the venerable judge. "These form the cement which binds nations together. If they are absent, no nation can prosper. It may appear to be great for a time, but it will eventually go down in ruin. England's rule, in the main, is for justice and righteousness, and therefore, I would safely predict permanence for her great empire."

Speaking of the relations between Britain and the United States, the judge said: "The only rivalry between the two countries, enlightened and tolerant, will be an industrial rivalry, of which we cannot have too much. English-speaking people, whether American or British, understand justice and will eventually do right. It is not their genius to do other. If there be irritation it will pass away; local acerbities will vanish. We are growing out of localism; we are taking the larger view." "Whether Canada will go on to nationhood," said the judge, in answer to another question, "or become a part of the United States, who can tell? One thing is certain—Canada can never be coerced to join us. No sane person would think of such a thing. If, after carefully considering the problem, both countries agree that it would be best to obliterate the imaginary boundary line and to become one, then I think their desires could be accomplished. But it is madness to talk of coercion. The day of force is over. We are having, and will have more and more, the reign of wisdom; and it will be wisdom and good feeling which will ultimately determine this matter."

Safety Appliance for Electric Wires.

We have received a photograph illustrating a test of a safety appliance for electric wires, in which the inventor, Mr. A. E. Hutchins, of Detroit, Mich., is represented as standing upon the wet ground, with naked feet and having in his mouth and wrapped around his body a wire connected with an electric line, said to be carrying a current under a potential of 3,000 volts.

The electric wire thus handled with impunity would produce instant death but for the safety appliance devised by Mr. Hutchins. This appliance consists of a bracket at the top of the pole which supports the line, the bracket having at its extremity a pear-shaped loop, the inner portion of which has a sharp edge. The wire extends through the loop without touching, and is held normally at such a distance from the side of the loop as to permit of the swinging of the wire and all usual vibrations, without forming any contact with the loop. When, however, the line breaks it drops upon the sharp edge of the loop, which cuts the insulation, if there be any, and forms an electric contact with the bracket, and the bracket being connected by a wire with the ground, the fallen wire is immediately grounded and the portion lying outside of the loop or within reach is thus rendered harmless.

Cycling and Heart Disease.

Under the above caption, in the Asclepiad, No. 43, vol. xi, third quarter, 1894-95, Sir B. W. Richardson publishes a revision of the interesting paper which he read before the Medical Society of London in January, on cycling in relation to diseases of the heart. The author has himself been a cyclist since 1877, and his powers of accurate observation and philosophic grasp are well known. What he has to say on this subject is therefore of great importance. The rapid increase in the number of persons using bicycles and the immoderation exhibited by some of the min the exercise will unquestionably, before long, introduce among the inflammations, neuroses and muscular affections, cycler's cramp, cycler's heart, cycler's muscular strain, cycler's joints, etc.

Confining our attention to the effect of cycling upon the organs of circulation, Sir B. W. Richardson divides them into two classes: First, the immediate effects of the exercise upon the heart and circulation as observed on the rider. Second, the after effects as observed in the consulting room or sick chamber.

First.—In all riders, at all ages, in experts as well as beginners, there is in the beginning of each attempt a quickening of the circulation, although there may be no consciousness of the attendant phenomena. The pulse is full and bounding, and throughout the ride there is a continued rapidity not amounting to the same degree as at first, but rarely falling to less than one hundred pulsations per minute. The rise of the pulse is considerably increased in climbing, with a fall on horizontal planes and a well marked fall in descents, especially if the feet be taken off the pedals, as is the practice of accomplished cyclists. Even if cycling be daily continued, these phenomena will be excited. The heart, if examined during a few moments of rest, in order to permit of auscultation, is full and bounding like the pulse. The external impulse is very pronounced, and the sounds are full, with not unfrequently an accentuation of the second sound. So long as the exercise is continued, an increase of cardiac motion is observable, the act of movement on the machine seeming sufficient to keep the circulation in vigorous and equal tension. This accounts, according to Richardson, for the astounding journeys that the fully trained cyclist can undertake, when in his prime, and for his endurance against sleep. There are some peculiar points connected with this overaction of the heart. For example, no rider is so embarrassed by it as to cause him to stop abruptly in order to dismount and seek rest, while one rider, who could not climb a flight of stairs on foot without resting many times during the ascent, complaining of breathlessness and palpitation, could, on the machine, climb hills without distress. It would be wrong to conclude from this that cycling is not injurious, because there has not been length of time enough to determine from many cases what the ultimate effect of long-continued riding may be. The evidence on this particular subject is unfavorable at a general glance, for several accomplished and skillful riders have, after some years, succumbed prematurely from diseases of the circulation, but there has been no sufficient pathologic inquiry to prove in what way the damage was developed.

Second.—Dr. Petit suggests that out of one hundred riders there is sure to be one at least who is affected with heart disease. The wonder, therefore, is why so few suffer in an immediate manner from the exercise. Petit seems to have known of two or three sudden deaths, but he does not tell how many hundreds or thousands of persons form the body of riders out of which this conclusion was drawn. Richardson has been giving attention to the matter since 1887, and knows of only five or six instances, physical accidents excluded, in which a cyclist is said to have died during the exercise, and he is not sure that in any of these cases the fatal result was to be attributed to the influence of the exercise upon the heart. If, however, we have to consider the continuous effect for some years on those in whom the elastic tissues have lost much of their primal elasticity, it is certain that there are many men and women in whom the circulation becomes disturbed ("distrained" is Richardson's word) by an arduous pursuit of the exercise. Fortunately there comes with this a "saving" distaste for the exercise which gives protection. For some obscure reason, one who has been a cyclist gives up using his wheel. Upon examination it is found that there is a feebleness of the circulation, coldness of the extremities and an unnatural languor and inability to sustain fatigue and a rather quick weariness if exercise on the machine be tried.

Contrary to what would be expected theoretically, cycling exercise carried out with moderation two or three times a week, if it be done without strain, as in hill climbing, and if it be not too long continued, as in a long stretch, proves an actual remedy in cases of fatty degeneration of the heart. Richardson relates, indeed, a case in which the exercise proved beneficial to a man of over seventy-five years, suffering with symptoms of senile failure of the heart. Horse exercise he believes not in the least degree comparable with cycling in these cases, while walking in any degree is all but impossible, because the limbs have to carry the weight of the trunk, and fatigue, which is very wearing, leads to more exhaustion than is balanced by the exercise.

Gouty dyspepsia is often very much benefited by moderate cycling. In cases of marked valvular disease, the exercise is not to be advised, but there are some cases in which it has been undertaken without apparently resulting harmfully. Intermittent pulse and palpitation may be improved by exercise on the tricycle rather than the bicycle, so that the patient may at any moment stop without alighting and shall not undergo the nervous strain which attends bicycling. In anemia, the exercise may be directly curative, especially in the case of women.

Overstrain in cycling is not merely a theoretic danger, but has actually been observed. There are two classes of subjects who are affected injuriously. The first are young persons, often mere boys, who are made to ply the machine, probably heavily loaded, for commercial duties and business. The boy really does the work of a horse in this way; he seems to enjoy it, and the employers, knowing no evil from it, let him do all that may be done. On account of the immaturity of the heart and arteries, they are easily expanded under improper pressure, and cardiac hypertrophy and disproportionate development of the heart and lungs is the result. Secondly, there are the extreme conditions shown in those remarkable athletes who enter into competitions that have never before been dreamed of in the history of the world.

The heart of the cyclist accomplishes in twenty-four hours a labor equal to lifting one hundred tons one foot from the earth, and this without sleep or rest on the part of the rider. Such feats cannot be repeated many times by one person without mischief to the heart

As a matter of fact, Sir B. W. Richardson has seen many cases, even among the so-called best athletes, in which the heart has become large, irritable, extra sensitive and easily intermittent. The arteries are distended, their elastic tissues enfeebled and their functions, as regards nutritive repairs, imperfect.

In both these classes of cases, the young boys who are made to work too hard and the athletes who engage in extravagant competition, degenerative change in the organs of the body generally is a result of the injury done to the heart and arteries. In advising patients on the subject of cycling, it is often more important to consider the state of the vessels than that of the heart. Enfeebled and worn-out arteries are more dangerous than an enfeebled heart.

There are three sets of acts which are most injurious in cycling; these are straining to climb hills or to meet head winds, excessive fatigue, and the process of exciting the heart and wearing it out sooner by alcoholic stimulants, to the omission of light, frequently repeated and judiciously selected food.—Philadelphia Polyclinic.

Motor Carriages.

When going to the carriage depot of Messrs. Peugeot, which is situated in the Boulevard de Gouvien St. Cyr, I met with many little experiences. On one occasion, what appeared to be a French engineer dressed in a blue blouse and overalls, and engaged in cleaning an engine, proved to be M. Pierre Giffard, of the Petit Journal and Le Vélo. We soon became good friends, and he told me that he was learning his engine. Later in the day he divested himself of his working clothes, and took me for a drive on the vehicle he had just purchased. On another occasion M. Menier, of chocolate repute, arrived with his horseless carriage, gave some instructions, and left again in the same manner. There also came a gentleman and his wife from New York to examine the carriages, and in the course of conversation it turned out that he was an electrical engineer, whose name was known to me, as well as mine to him. One afternoon an elderly French gentleman arrived with his wife on a similar errand. I did not listen to the whole conversation, as it would have been impolite, but I could not help overhearing a good deal, as they were close to my side. The lady seemed greatly surprised that the carriages were not wound up before starting. Upon being told that petroleum was employed for the power, she expressed her astonishment that a light should be employed in any part of the engine, believing that the carriage was run by the weight of the petroleum alone. This worthy couple were so dissatisfied with the present condition of mechanical knowledge that they went away in disgust. This is one of the small trials which the engineer of the establishment has to put up with in the course of daily life. In crossing the main avenue, which runs from the Arc de Triomphe to Neuilly, we met a smart little victoria without a horse. A lady, elegantly dressed, was seated inside, with a liveried coachman on the box. I was told that this lady was a well-known actress of the Theatre de Français, who lived outside Paris, and went daily to the Magasins du Louvre and the Bon Marché to do her shopping, the distance traveled being no less than five miles each way. She had started this carriage from motives of economy, and her coachman had been broken in to drive the new horse. We met many other such vehicles, but they were chiefly out on experimental runs. In one case it was a carriage used for advertisement purposes by a well-known establishment—Le Chat Noir.

Improvement in Gold Mining.

Recent reports of increasing production of gold in this country and elsewhere have attracted attention to new methods of mining and treating the ore, which have greatly reduced the cost of obtaining the metal, and made possible the working of mines containing a very small percentage of gold. In the Colorado gold district the best results in this direction have not yet been reached. It is predicted that when the time comes for the enormous deposit of low grade ore proved to exist at Cripple Creek to be treated anywhere near as cheaply as the cost at Johannesburg, Cripple Creek will produce more gold than Johannesburg, where ores are treated by stamp mills, the "tailings" being passed through cyanide mills. Ten years have been spent in reaching the high state of efficiency and economy there.

Rossiter Raymond, a mining engineer who has had experience in the Colorado mines, said:

The reduced cost of obtaining gold from ores or rock containing it is due:

"(1) To the numerous new deposits of gold opened within the last few years. Such deposits are, of course, more cheaply mined while operations are conducted near the surface. In this country the increased activity in gold mining is doubtless due largely to the discouragement of silver mining by the fall in the price of silver. A large army of prospectors, formerly seeking for silver mines in preference to gold, is now looking for gold. But the most important new developments in gold are those in South Africa, where the deposits (though they have been overestimated in the speculations of the London stock market) are unquestionably of immense value and productive capacity.

"(2) To the increased efficiency of mining methods and machinery (high explosives, power drills, improved hoists and pumps, cable tramways, etc.), which permits large quantities of low grade material to be handled at a profit.

"(3) To the cheapening of labor and supplies by the extension of railroads, the increase of population, etc.

"(4) To the multiplication (especially in this country) of smelting and other reduction works, which can utilize other ingredients in gold-bearing rock (lead or copper directly, and iron or silica as fluxes), so as to be able to pay to the miner, in some cases, the full value of the gold.

"(5) The only innovation in metallurgical methods for the extraction of gold, apart from variations in smelting processes, is the so called 'cyanide' process, which promises to treat cheaply certain classes of ores and 'tailings.' Its principal competitor is the chlorination process, which is very old, but has been much improved, and is now the most perfect of all methods for gold extraction from material suitable to it. This process usually requires a preliminary 'roasting;' and it is claimed that the 'cyanide' process can be successfully operated without that preliminary. Probably the ultimate verdict of practice will be that each process has its special field, and that the choice between them will depend upon a careful consideration of all the elements of the special case—nature of material, cost of chemicals and skilled labor, expense of plant, etc. At the most successful of the Southern gold mines, the Haile mine in South Carolina, a profit is secured from material containing as mined about $4 per ton. This is first crushed and amalgamated in a stamp mill, and then the sulphide ores, unaffected by amalgamation, are saved by mechanical concentration, to be roasted, chlorinated, and leached.

"Rock yielding free gold to the extent of $3 per ton can be mined and amalgamated with profit under favorable conditions as to size and accessibility of deposit, cost of power, wages, etc., provided the operation is on a large scale."—The Evening Post.

Important to Millers.

The United States Circuit Court, Eastern District of Pennsylvania, in the case of Henry B. Keiper and Lanious B. Keiper, complainants, vs. Charles Miller, defendant, holds that the patent granted to Samuel M. Brua, November 12, 1878, No. 209,795, is valid and the defendant has infringed as alleged.

The Brua case dates from September, 1892, when Samuel M. Brua assigned to Messrs. H. B. & L. B. Keiper, of Lancaster, Pa., his patent No. 209,795, of November 12, 1878, for a "Process in Milling an Improved Grade of Flour," the claim of the patent reading as follows:

"The process of producing an improved grade of flour, consisting essentially in continuously mingling the corresponding grades of the valuable products of the first and after grindings, respectively, for running off the finished flour uniformly pending the regrinding and rebolting, substantially in the manner and for the purpose verified."