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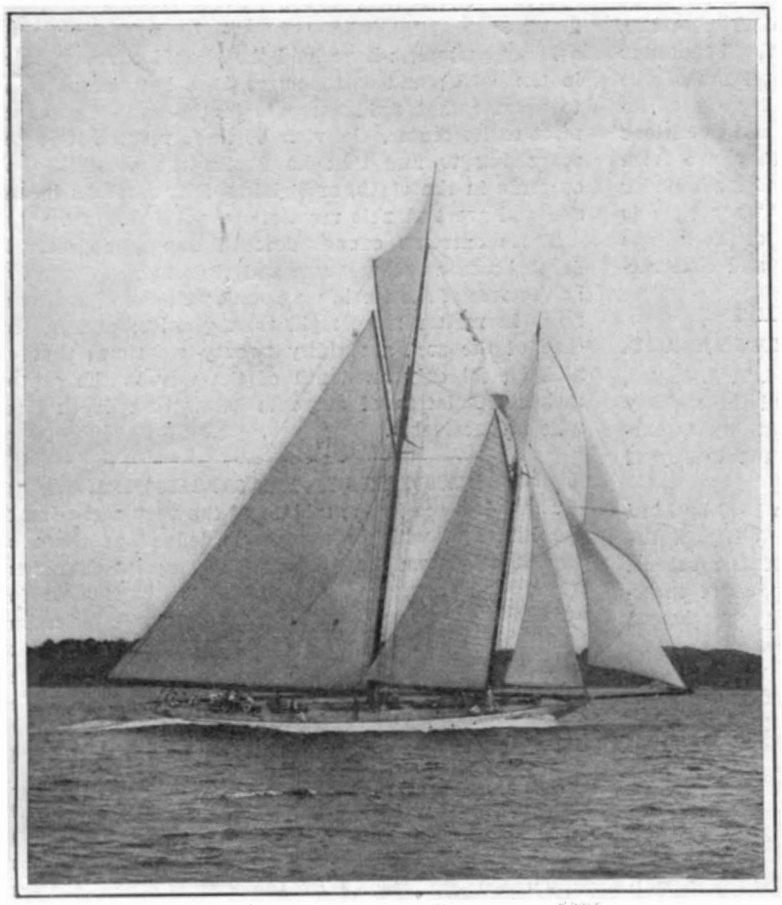
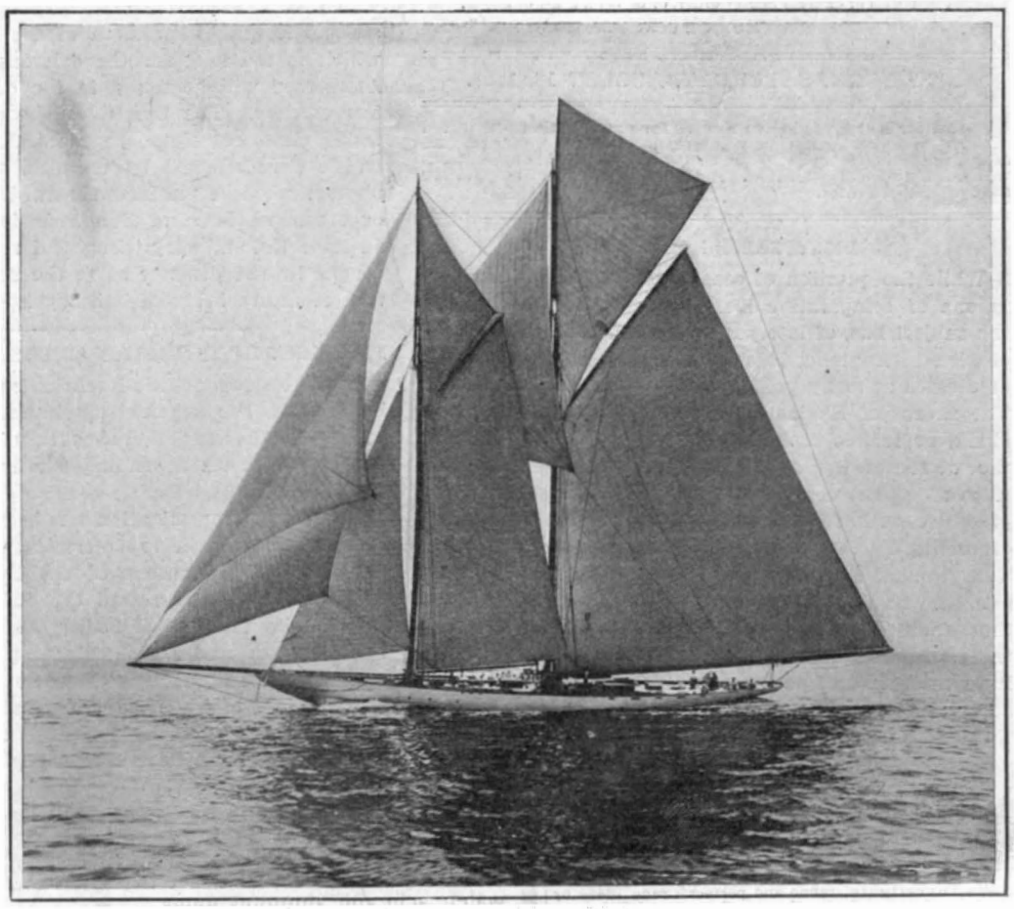
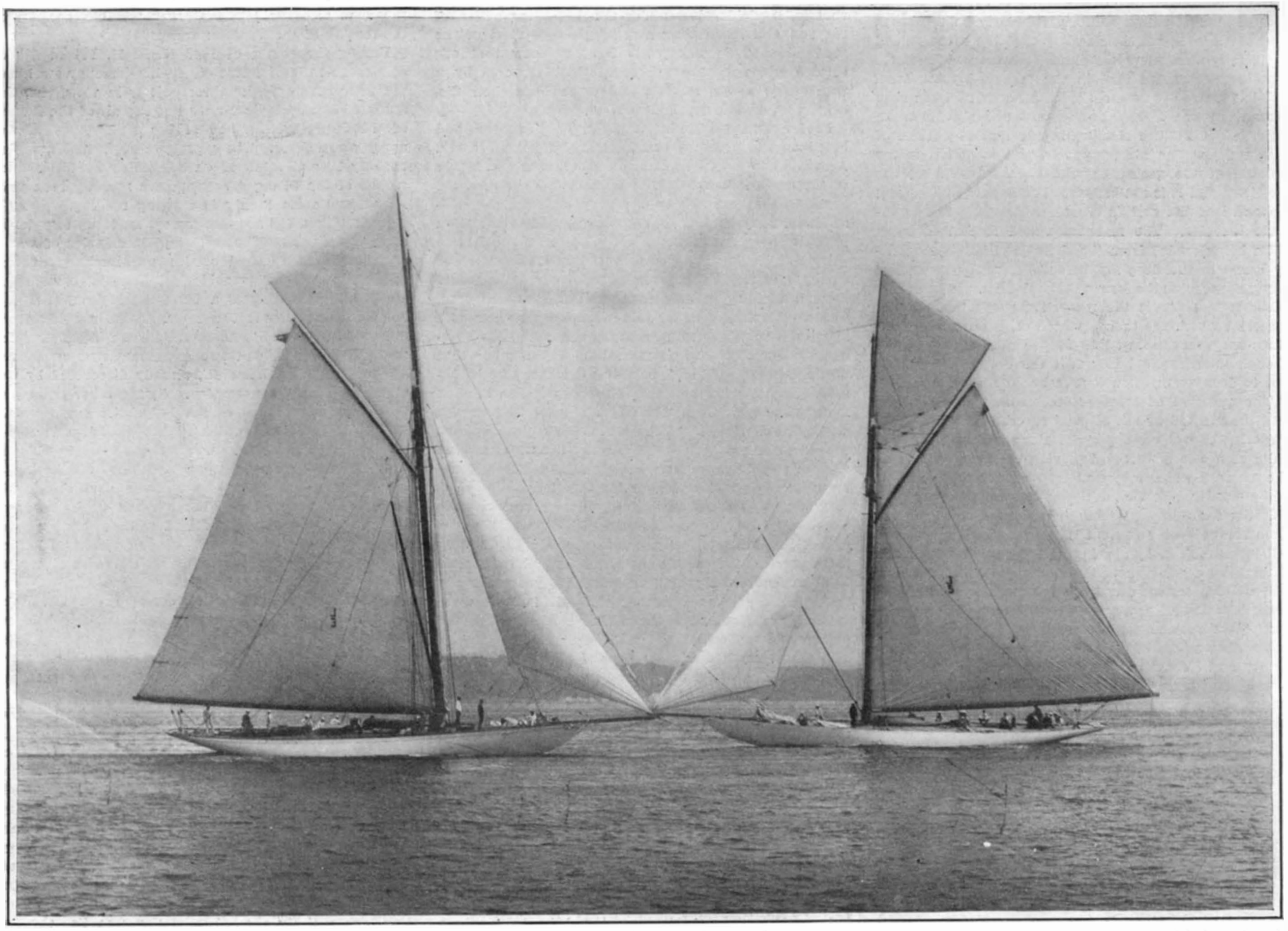


Length on Water-line, 90 feet.
Schooner "Queen." Second Position.



Length on Water-line, 87 feet.
Schooner "Elmina." Third Position.



Length on Water-line, 65 feet.
Sloop "Irolita." Entered, Did Not Start.

Length on Water-line, 65 feet.
Sloop "Effort." Winner of King's Cup.

CRUISE OF THE NEW YORK YACHT CLUB.—COMPETITORS FOR THE KING'S CUP.—[See page 112.]

SCIENTIFIC AMERICAN

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NEW YORK, SATURDAY, AUGUST 18, 1906.

The Editor is always glad to receive for examination illustrated articles on subjects of timely interest. If the photographs are *sharp*, the articles *short*, and the facts *authentic*, the contributions will receive special attention. Accepted articles will be paid for at regular space rates.

DISAPPEARING ENGLAND.

While the question of coast erosion and reclamation is one of comparative insignificance in this country, the subject has, of late years, aroused considerable discussion in England, because of the undoubted ravages of the sea at many points of the littoral of the island. The shores of England are composed largely of clay, chalk, or friable rock which is easily eaten away by the waves of the ocean or the strong currents and tides along the coast. In consequence great stretches of the shore have been worn away and are constantly crumbling further inland with each succeeding year. This gradual destruction has caused great damages to many towns situated on the seashore and has destroyed thousands of acres of valuable farming land. At certain locations, even within the memory of men still living, the sites of prosperous villages of former times are to-day covered by many fathoms of water, sometimes several miles from the present shore line.

Coast erosion following severe storms within recent years has been so marked at many points on the English coast that after extended press discussion a Parliamentary commission has been appointed thoroughly to investigate the subject, and if possible to devise means for the abatement of the injury. While there is little danger that the "tight little island" will completely disappear within the next few generations, there can be no doubt that coast erosion is causing serious loss of land at many points, particularly on the south and east coasts, notwithstanding that the areas gained artificially at other points almost compensate for it. It has been estimated that in the thousand years from 900 to 1900 an area of nearly 550 square miles has been worn away by the erosive action of the waves and ocean currents. That the changes in the littoral outline of England are due almost purely to this action is the opinion of the geologists who have investigated the question, and it is not believed that the subsidence and upheaval of the earth's crust are in any way responsible therefor. The material which is carried away after being eroded from the shore is either immediately borne to the deep sea in suspension, or is washed along the coast in the form of littoral drift. It is hardly possible to estimate the respective proportions of the material which are thus disposed of, but these proportions may vary from 20 to 90 per cent of the whole, though it is hardly likely that the proportion carried out to deep water often approaches the latter figure.

The question of coast protection is a difficult one, and the method in use at present, comprising the construction of walls and groynes along certain areas, results of necessity in the depriving of the foreshore of the material which might otherwise gather there. Thus while a uniform system of protective walls and groynes running from the walls out into the sea will, for the time being, largely prevent the erosion of the coast, it will nevertheless, by abating or largely decreasing the littoral drift, bring about the depletion of the foreshore and will ultimately cause the destruction of both protective walls and groynes. The question of coast protection and reclamation presents engineering difficulties of no mean magnitude, and the overcoming of these difficulties will constitute an interesting phase of future engineering history, for we feel certain that English technical men and men of science will find successful means for combating the destructive power of the sea.

AFTERMATH OF THE SAN FRANCISCO FIRE.

In drawing the proper lessons from a disaster of the magnitude of the San Francisco earthquake and fire, care must be exercised lest too great an emphasis be laid upon particular and unrelated incidents and effects. It has been claimed, and doubtless with some measure of truth, that in the early photographs of the fire, and particularly those of individual buildings or parts of buildings wrecked by the fire, that were published soon after the disaster, there was too much broad generalization based upon insufficient data. It is only now, after there has been time to gather and classify material in the way of photographs and observations by experts, that the public is being placed in possession of well-digested lessons drawn from the disaster. We have recently been favored with a large number of photographs and an extremely interesting discussion of the San Francisco fire and its lessons by Mr. F. W. Fitzpatrick, the secretary-treasurer of the International Society of State and Municipal Building Commissioners and Inspectors, of Washington. The article was called forth by some photographs showing the respective behavior of fireproof tile and of concrete protection in the recent fire, which were published in the SCIENTIFIC AMERICAN of June 9, 1906, and which Mr. Fitzpatrick criticises as giving a one-sided and misleading impression of the facts. The article, which is too long for the columns of the SCIENTIFIC AMERICAN, will be found in the current issue of the SUPPLEMENT. The illustrations consist largely of interior views of columns, girders, floors, and partitions which were affected by the fire, and they are from photographs selected from several hundred made under expert supervision at San Francisco. The article is an impartial and very thoughtful review of the lessons taught by the disaster as to the design and construction of future fireproof buildings.

PROF. SEE'S INVESTIGATION OF THE EARTH'S RIGIDITY.

In the Astronomische Nachrichten Prof. T. J. J. See, U. S. navy, has exhaustively investigated the rigidity of the earth and other heavenly bodies, by mathematical processes depending wholly on the theory of gravitation.

This line of investigation was begun in 1863 by Lord Kelvin, who sought to determine the rigidity of the earth from observations of the tides of the oceans. Tidal observations secured the only means of ascertaining the amount of bodily distortion experienced by the earth under the disturbing forces of the sun and moon; and it was thought that if the earth proved to be highly rigid, the result would contradict the theory long held by geologists that the earth is a globe of molten matter inclosed in a thin crust, like the shell of an egg.

Lord Kelvin reached the conclusion that the earth as a whole is certainly more rigid than glass, but perhaps not quite as rigid as steel.

About 1880 Sir George Darwin took up the investigation, and considerably extended and improved Lord Kelvin's method. By careful study of the fortnightly tides he found the earth to be more rigid than steel; that is, it yielded less under the disturbing action of the sun and moon than a solid globe of steel of the same size. This was justly held to show that our earth could not be a sphere of liquid covered by a thin crust; and geologists had to conform their theories with a globe as rigid as steel.

Prof. See's investigation is purely mathematical, and based on the pressure existing throughout the earth. According to Laplace's law, the density at the center of the earth is equal to that of lead, and the pressure equal to that exerted by a vertical column of quicksilver as long as the distance from St. Louis to San Francisco.

By considering the pressure throughout the whole earth, it is found that even if fluid, our globe would have a rigidity greater than that of wrought iron. The earth's matter under this great pressure acts as a solid, and so vibrates in an earthquake; and the average rigidity of the whole mass is nearly equal to that of nickel steel, such as is used in the armor of a battleship. Nickel steel is one of the strongest and hardest metals known, and it affords us a good idea of the strength and rigidity of the earth. Our globe is thus proved to be capable of withstanding enormous strain; and we need have no fear that earthquakes or volcanic outbursts will ever endanger its stability.

Dr. See proves that the rigidity of the earth's crust is about equal to that of granite, which is one-sixth that of steel; and that toward the center the rigidity rapidly increases. At the earth's center the imprisoned matter is at an enormously high temperature, yet under the tremendous pressure there at work, it is kept three times more rigid than the nickel steel used in the armor of a battleship.

His new method can be applied also to the other planets. Heretofore no method has been known for finding the rigidity of any mass except the earth on which we live. But the gravitational method can be applied with entire confidence to Venus, Mars, Jupiter, or Saturn, and we can find their rigidity almost as accurately as we can that of our own globe.

It turns out that the rigidity of Venus is greater than that of platinum, and most likely about identical with that of wrought iron. The rigidity of Mars is about equal to that of gold, while the rigidity of Mercury, the moon, and other satellites is about equal to that of glass.

The average rigidity of the great planets, Jupiter, Saturn, Uranus, and Neptune, lies between eighteen and three times that of nickel steel. The great rigidity of these bodies is due to the great pressure acting throughout such large masses. In the case of the sun the result is still more extreme. The average rigidity of all the sun's layers is over two thousand times that of nickel steel.

This result affords a good idea of the effect of gravity in compressing and hardening a mass, even when it is self-luminous and at enormously high temperature.

Having shown by laborious calculation that these bodies are so rigid, Prof. See has gone one step farther, and inquired what effect this rigidity will have on the currents often supposed to circulate within these masses. As pressure directly increases the fluid friction of moving currents and tends to bring them to rest, it is not surprising to find that the rigidity almost prevents circulation, especially deep down in these masses.

Many geologists have held that liquid currents exist in the earth; and astronomers have been accustomed to assume that fluid currents in the sun descend almost to its center. In view of these results, it is not surprising to find that he denies the possibility of currents in the earth, and claims that currents in the sun and great planets must all be quite shallow.

These currents cannot descend to any appreciable depth, because the pressure and rigidity are too great. In the case of the earth, we cannot well conceive of currents in matter more rigid than granite; and in the case of the sun, a rigidity twenty-two times that of nickel steel only one-tenth of the way to the center makes circulation of currents below that depth likewise inconceivable.

DISCOVERIES IN THE SARGASSO SEA.

There is a sea in the middle of the very ocean itself, the limits of which are as well defined as those of any other known large body of water; its characteristics are so peculiar, too, that it is impossible for anyone to mistake them. The first glimpse Columbus had of this sea reminded him, so it is said, of an "undulating meadow"; as far as the eye could reach, the sea was covered with a greenish yellow plant, just as completely as water lilies do a pond. Ever since that day when the immortal Christopher first saw the weed, and doubtless for thousands of years before then, the Sargasso Sea (for such is the name of this strange body of water) has existed. Its boundaries may be indicated by tracing a triangle, the three corners of which are represented by the Azores, the Canaries, and Cape de Verde. Within these limits the surface of the sea is covered with so thick a coating of seaweed as to prevent vessels from sailing through it. Steamers also avoid it, whenever possible, because of the fouling of their screws and paddles by the weed.

During the course of 1905 H. R. H. Prince Albert of Monaco sailed for this sea in his famous vessel, the "Princesse Alice," with three objects in view, viz., the study of bathypelagic faunas in general, of the faunas of the Sargasso Sea, and of the meteorology of the upper atmosphere. The vessel sailed from Marseilles on July 20 and returned on September 24, 1905. The results of the 64 days' voyage have recently been published, and form highly interesting reading.

No less than 118 soundings were made up to a depth of 5,580 meters (18,302 feet) and 28 samples of water were taken in Richard bottles and Buchanan tubes. Some very interesting zoölogical finds were made, of which the following is a brief description. With a bag-net there were secured (at depths ranging from 606 to 11,364 feet) numerous Alcyonariæ, several interesting crinoids, and two extremely rare specimens of *Gephyrocrinus Grimaldii*, already discovered by the prince on a previous occasion. Among other crustaceæ there was a specimen of the *Polycheles eryoniformis* Bouv., a new species which recalls the Jurassic eryon by its dilated carapace. Another net, sunk to a depth of 11,364 feet, brought up a rich find, comprising a new type of *Cinroteuthis* of a uniform black color, with large black brachial papillæ; a small Cephalopod, of an undoubtedly new type and species, having telescopic eyes and an extremely singular trilobial luminous organ. By far the most productive accessory of the campaign was found to be a wide-mouthed vertical net; in fact, adequately to describe the numerous specimens secured with its aid would require a booklet. Forty-one descents were made, to a depth of 17,712 feet, and, in most cases, the specimens obtained were similar to those obtained in the course of researches made a year ago elsewhere. The most striking objects were a new Ulmarida of the color of wine lees, closely related to the Aurelia, and constituting the first member of this family found in deep waters; of the Ostracod family there were some large spherical *Gigantocypris*, and several specimens of a large black (or almost black) Ostracod, the shape of which may be likened to the pip of a ripe pear, several relatively speaking new species of Nemertæ, especially a large orange-colored variety, hitherto rarely found among bathypelagic fauna; and finally some transparent Annelidæ with large red eyes, and several types of Phronima, one entirely new. In the Sargasso Sea the net also brought up one of those curious crustaceans of the Eryoneicus type; it is quite new, and M. Bouvier,

member of the Oceanographic Institute (who accompanied the expedition, together with Dr. Richard, director of the Monaco Oceanographic Museum, and other equally distinguished gentlemen) has christened it the *Eryoneicus Alberti*.

The fauna inhabiting the Sargasso Sea was studied on the surface, between the latter and the bottom, and on the bottom itself up to a depth of 11,364 feet. A numerous but sparsely varied fauna lives amid the weed covering this sea; it comprises Actiniæ, Ascidiæ, Nudibranchiæ, Crabs, Isopods, and a few pelagic animals clinging mostly to the surface of the weed. Mimicry is a very marked feature of animal life in the Sargasso Sea. A new species of pelagic Holothuria was found, and there were captured on several occasions many specimens of a curious hemiptera (*Halobates Vüllerstorffi*) which jumps about on the surface of the sea.

An interesting item of the voyage was that (when in the Sargasso Sea at a distance of 840 miles from the nearest continent) the "Princesse Alice" was visited by five swallows of the American variety called *Hirundo rustica erythrogaster*, Bodd. A remarkable feature of the whole region comprised between the tropics, the continent of Africa, and the Azores, is the almost total lack of any animal life on the surface of the sea. No cetaceans or marine birds were met with; flying fishes and the Plankton were the sole redeeming features in a dreary and silent waste of waters. A curious double lunar rainbow was seen on one occasion (August 28, 1905), and was painted by an artist accompanying the expedition. The curious phenomenon known as the "Green Ray" was also often seen.

ELECTRICITY AND MATTER IN A GASEOUS STATE.

BY PROF. EDGAR L. LARKIN.

When Newton announced the law of gravity, the effect must have been akin to the discovery of radium in our own time. Really, a rapid wave of expanding science spread over the world, and everybody talked about the mystery of all time, gravity. What has happened? If a newly discovered law equal to that of attraction should now be telegraphed to every scientific body in existence, would a scene of animation and activity set in? Or, have discoveries "followed fast, and followed faster" of late than can be assimilated? Or, would the discovery of what gravity is, or matter, or mind, occasion more than a few remarks on a street corner, about the passing wonder?

Ionization and conductivity are equal to gravity. They form two granite and hewn stones round about and under nature. If the actual gravity is ever explained, the explanation must and will be found hidden in these. All scientific men were filled with admiration—yes, hidden adoration—for Newton, when the Principia appeared. But another Principia is here—a book, "The Conduction of Electricity Through Gases," by Prof. J. J. Thomson. To the writer, it is as a basic Principia, upon which can be erected a vast, new, and comprehensive view of all that part of the universe known to man. Since Newton, literatures of science have teemed with the sentence: "Inversely as the square of the distance." But a new term or sentence is now appearing in scientific literature of the highest type. Here are quotations: "The saturation current between two parallel plates of given area depends upon the amount of the ionization that takes place throughout the whole volume of gas between the plates, then the greater the distance between the plates the greater is the saturation current, so that if we use constant potential differences large enough to produce saturation, the greater the distance between the plates the larger is the current. Thus the behavior of the conducting gas is very different from that of a metallic or liquid electrolytic conductor; for if such conductors were substituted for the gas, the greater the distance between the plates the smaller would be the current." And: "The peculiarities shown by the conduction through gases are very easily explained on the assumption that the conduction is due to ions mixed with gas" (p. 13, Thomson). And another: "The condition essential to stability in chemical combination is, 'The attraction of one atom to another (or others) increases as the distance increases'" (Berisford Ingran, Knowledge, April, 1905, p. 75). Since science began, there have not appeared more important discoveries or wisdom. While heat, light, gravity, magnetism, and electricity, when in the form of circular waves, vary in intensity inversely as the square of the distance, electricity, while traversing ionized gases as a "current," increases in quantity as the distance increases! This surely is because it gathers up ions on the way from one mass of matter to another, that is, takes up electricity. If the masses are two suns forming in space, from primordial gas, ionization allows colossal quantities of electricity to circulate from sun to sun, whether two or two trillion. And this brings the writer of this note to the point of starting, for during many years we have advocated, in season and out, the electrical basis of the universe. On page 8 Prof. Thomson says: "The electrical conductivity of gases in the normal state is so small that, as we have seen, the proof of its existence requires very careful and elaborate experiments." Then he gives several ways of making excessively rare gases conducting, thus: Draw them from the neighborhood of flames, or from electric arcs, or from glowing metals; but far better is to allow Röntgen, Lenard, or cathode rays to pass through them, or rays from uranium, radium, polonium, thorium, and ultra-violet light to traverse and ionize. Thus two metallic plates may have rare gas between them, and electricity would have difficulty in forcing a passage. Now ionize the gaseous particles, i. e., separate them into corpuscles, and electricity will "flow" from positive to negative with slight resistance, and external rays from any radio-active substance are able to ionize. It is almost impossible to resist the temptation to apply the new laws to cosmological processes in primitive conditions of matter. This primordial state was without doubt gaseous. Perhaps dissociation reigned. At all events, the mechanics of liquids and solids did not act. Finer forces, radio-active energies, and activities wrought for ages before gravity wheeled worlds into revolving systems. Let two suns be, say, within 25 trillion miles of each other. The space between, if filled with normal gas, would offer high resistance to transmission of electricity. Let rays from radium or any electrostatic field shoot across the intersolar gases at right angles and ionize them; then vast flows of electricity would take place from sun to sun. There was a circulation throughout the universe then, as well as now. The entire structure of nature is a living unit. It has a pulse. All matter by hypothesis was once ultra-gaseous. It therefore obeyed laws able to act on matter in that state, and no others. Every one of the laws is electrical.

Deviation of rays is a stupendous fact, deep-seated and far-reaching. From a study of the bending aside of rays in laboratories, imagination can easily carry back to primordial cosmical times. Radium emits alpha, beta, and gamma rays and many others besides. Magnetism is able to turn alpha rays one way and beta the other. The fact stands out that they are separated. Gamma rays cannot be bent out of their original straight lines. To begin gravity, matter must be charged with electricity. Of course, this is a "working hypothesis." This is the way to do it.

Let vast masses in space, like the nebula in Orion, or like the giant suns Antares or Canopus, be radio-active, and let floods of rays pour into space—for a frigid nebula or a hot sun can be radio-active.

Let an enormous mass be, as it were, an electrostatic "field" in space many million miles away. Electrostatic fields attract and repel precisely like a magnet. Floods of alpha, beta, and gamma rays attempt to pass in front of this field. Let a stream of alpha rays be separated out and be deviated to one side. Let them strike a world in process of formation. It will instantly be positively electrified. And another electro-magnetic or static field can deflect beta rays upon other worlds, and charge them negatively. Charges are thus set up daily in physical laboratories; why not in space? Radio-active rays are absorbed by matter with great avidity. But these rays must be electric, else they could not be diverted by magnetism. At present, it is not known what effect gamma rays have when they hit a forming world. For world building has not ceased. Another cosmical worker is induced radio-activity. An active nebula or sun can establish activity in others at a distance. It is a common thing to charge suspended insulated spheres by induction electrically in every laboratory. Suns may differ actually in their phases of matter, as much as their spectra. Thus let a nebula in space at the absolute zero of temperature be composed of corpuscles—bodies smaller than the chemical atom—in dissociation.

Let alpha rays only be deflected upon it for a million years, and let beta rays fall on another nebula; then the phases of matter produced would no doubt differ. The suns condensed from them must be unlike and project differing spectra. From the vast mass of literature received on this mountain peak, it appears that the entire scientific world is going the radio-active way. And well it is, for radiant energy, in the forms of alpha, beta, gamma, Röntgen, Becquerel, and doubtless a hundred other kinds of rays, together with deflection, induction, catalysis, "acting at a distance," and ionization—these all, and surely others not yet discovered, were and still are the cosmical builders, workers, and carriers. When Crookes lighted up his low-pressure tubes he opened the gates of a world more inscrutable than that of Hermetic mysteries. And a science of boundless ramifications into every nook and corner of nature is founded and grounded on Prof. Thomson's classic book. Electricity can start from one sun to go to another. If electro-active fields are passed, then the primitive gas is ionized, and the original quantity gathers more as it flies and pours a larger flood on its neighbor. It does not weaken as the squares of the distances increase. This is absolutely new in science, is revolutionary in character, is literally true, and will overthrow all existing cosmological theories. Soon it will be admitted that electricity exists in a practically infinite number of modes and forms, ordinary "currents" and "charges" being common-place. In a few years it will be fashionable to say that a cubic inch of iron and another of water contain equal quantities of matter; since both are nearly incompressible, and that the reason why iron tends toward the center of the earth with a force 7.8 times that of water, is because it contains 7.8 times as much electricity.

Lowe Observatory, Echo Mountain, Cal.

THE DESCENT OF MAN.

Kollmann, the professor of anatomy, has recently written an exhaustive article on the subject of the relationship between man and the *Pithecanthropus erectus* of Dubois. It will be remembered that some years ago Dubois discovered in the island of Java some bones, the femur and several bones of the cranium, which resembled both the corresponding bones in the human frame and also in the frame of a monkey. This discovery was much talked of, since it was thought that in these bones had been discovered portions of a prehistoric animal, which might have formed the so-called missing link in the chain of descent of man from monkey. It was the scientist Schwalbe who, in accordance with this idea, christened this hypothetical animal with the name *Pithecanthropus erectus*, or man-monkey standing erect. A minute examination of the bony remains of Java permitted the hypothesis that they had belonged to a being of great stature, with habits still arboreal, and which probably passed a great part of its time in the trees, but which, like man, already possessed the faculty of speech. But Kollmann now shows that although these bones discovered in Java are of great paleontological importance, they should be interpreted in quite a different manner. He asserts that the animal to which they belonged could not have been a precursor of man, for, although they certainly belonged to one of the most highly developed of the anthropoid apes, its habits and customs could not have differed from those of its cousins still living, the chimpanzee, the gorilla, the orang-outang, all species of animals which have reached the extreme limit of their variability. Kollmann is rather of the opinion that the direct antecedents of man should not be sought among the species of anthropoid apes of great height and with flat skulls, but much further back in the zoological scale, among the small monkeys with pointed skulls; from these he believes were developed the human pygmy races of prehistoric ages, with pointed skulls, and from these pygmy races finally developed the human race of historic times. In this manner may be explained the persistency with which mythology and folk lore allude to the subject of pygmy people, and it would also explain the relative frequency with which recently the fossils of small human beings belonging to prehistoric periods have been discovered.

THE DEATH OF DANIEL B. WESSON.

After a long illness Daniel Baird Wesson, the rifle and revolver maker, died at Springfield, Mass., on August 4.

Born in Worcester, Mass., Mr. Wesson was the founder of the firm of Smith & Wesson. He went to Springfield a poor man, but died immensely wealthy.

He was the inventor of the cartridge with a percussion cap. In 1883 he formed a partnership with Horace Smith, of Norwich, Conn., and there worked out the principles of the Winchester rifle. He first put into use the self-primed metallic cartridge, used during the civil war. About the same time he succeeded in perfecting a revolver, the principal feature of which was that the chambers ran entirely through the cylinder.

Mr. Wesson was also the inventor of several other improvements in firearms, the most important of which were the automatic cartridge shell extractor and the self-lubricating cartridge. He also introduced the hammerless safety revolver.

It is reported that the Canadian Pacific Company has decided to await the outcome of experiments by the New York Central and New York, New Haven & Hartford Railway Companies before taking steps for the electrification of any part of its system. Both the latter railways are spending enormous sums upon experiments, the former with a direct and the latter with a single-phase alternating current. The line from Montreal to Quebec will in all probability witness the first installation. All the electric power necessary can be obtained from the Shawinigan Falls.

Efforts are being made, by constructing embankments, to improve the channel at Rouen and keep it to one course, the present difficulty being that the channel is constantly shifting. Plans are now under consideration for the lengthening of the embankment on the left side of the estuary, and for the construction of embankments on both sides of the same to confine the channel to certain limits between Val de la Haye and Biessard.

THE RACE FOR THE KING'S CUP.

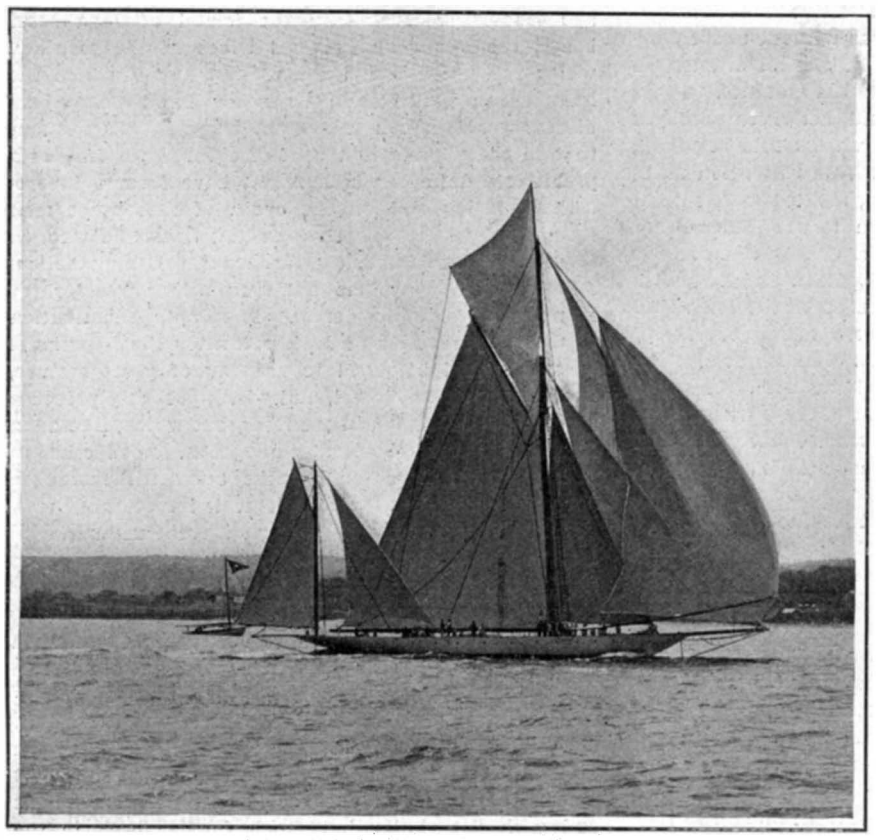
The first race for the $5,000 gold cup presented by King Edward VII. to the New York Yacht Club as a challenge cup to be raced for annually, took place on Wednesday, August 8, off Newport. In point of interest and importance this event compares with the famous races which have been sailed off Sandy Hook during the past half century for the famous America's cup. Ever since it was announced that the new yachting trophy had been offered and accepted, a large number of prominent yachtsmen have been directing their efforts toward the much-coveted distinction of having the name of their yacht inscribed on the cup as the first winner thereof. Practically all of the fastest of the American yachts, or at least those of them which were supposed to have any chance of success, were put into commission this year; and they have been tuned up into first-class condition by following the racing circuit throughout the season. Moreover, two out-and-out racing yachts were built especially to win this trophy.

As compared with the races for the America's cup, the competition for the King's cup had this decided advantage—that the yachts were built, and the time allowances calculated, under the new rule of the New York Yacht Club, which was framed with the idea of promoting the construction of a more wholesome type of yacht, with less of the "freak" about it, than those which have been turned out under the old rule governing the America cup contests. Under the latter rule, as most of our readers are aware, the yachts are rated according to the amount of sail that they carry and their length on the water-line. The result of this has been that in the effort to obtain power and speed the yachts have been built with extreme breadth and draft, and with excessive overhangs, the limit of excess having been reached in the "Reliance," which, on something less than 90 feet of water-line, had a beam of 27 feet, a draft of 20 feet, and an over-all length of about 140 feet. With nearly 100 tons of lead upon her keel, she was able to carry the enormous sail spread of over 16,000 square feet. The main object aimed at in the design of these boats was to carry a maximum amount of canvas on a minimum amount of underwater hull, or with a minimum amount of wetted surface and displacement.

The new rule of the New York Yacht Club places a heavy penalty on these extreme features, and a designer having in view the heavy penalties imposed on extreme overhangs, shallow immersed body, etc., finds that the type of boat best calculated to win the cup is one of a more wholesome form, with a deeper body, finer ends, and larger displacement. It is the hope of all yachtsmen the world over who take an interest in the America cup, that the new rule will be made to apply to the races that may be sailed in future for that famous trophy. If it should be, there is no question that challenges will be sent in and yachts will be built which, after the races are over, will, because of their seaworthy qualities, be serviceable for racing, and even cruising for many years to come.

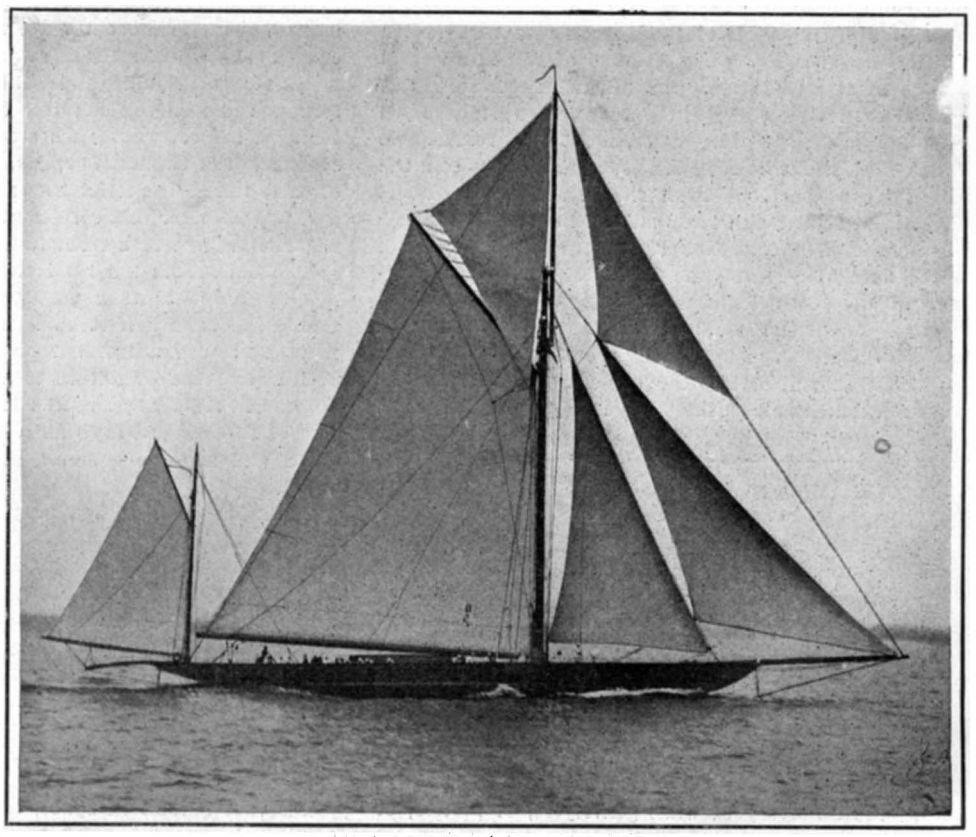
Of the nine yachts which started for the King's cup, two, the schooner "Queen" and the sloop "Effort," were built this season especially to compete for the cup; and it is significant that these two were first and second in the race, which was won by the "Effort" on time allowance, with only nine seconds to spare. The "Queen" is a keel schooner with an auxiliary centerboard, built of steel, and designed by Nat Herreshoff for J. Rogers Maxwell. She measures 90 feet on the water-line, 126 feet on deck, 24 feet beam, and draws 14 feet 10 inches of water. She spreads 11,000 square feet of canvas. She has been sailed steadily through all the important races of the present season, and is decidedly the fastest yacht afloat this year in these waters. What she would do against the modern single stickers, built under the old rule, is problematical; although from the decisive way in which she defeated the "Vigilant," now sailing as a yawl, it is quite possible that in a fresh breeze she could save her time allowance on such yachts as "Constitution" and "Reliance." The "Effort" is a bronze sloop designed this year by H. J. Gielow for F. M. Smith, and built by Robert Jacob at City Island. She is 65 feet on the water line, 93 feet 3 inches on deck, 16 feet 6 inches in breadth, 6 feet 9 inches in depth, and draws 11 feet of water. She is an out-and-out racing sloop, with steel frames and bronze plating, and throughout the season has done some excellent racing against those other bronze boats the "Weetamoe" and "Neola," the former of which, although four years older, has proved a very worthy opponent, winning several races against the new sloop. The "Weetamoe," which, much to the regret of yachtsmen, was one of the yachts entered for the race which did not cross the line, is 56 feet on the water-line, 89 feet 6 inches on deck, 16 feet 6 inches in beam, and draws 11 feet 6

(*Continued on page* 114.)



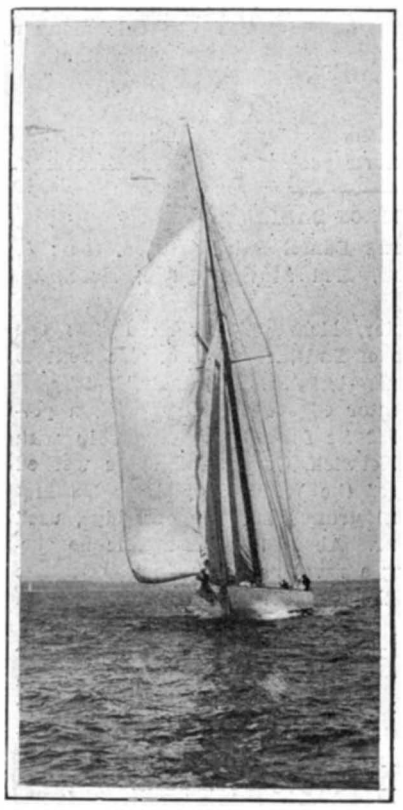
Length on Water-line, 86 feet 3 inches.

Yawl "Vigilant." Sixth Position



Length on ater-line, 90 feet 6 inches.

Yawl "Sybarita." Entered But Did Not Race.

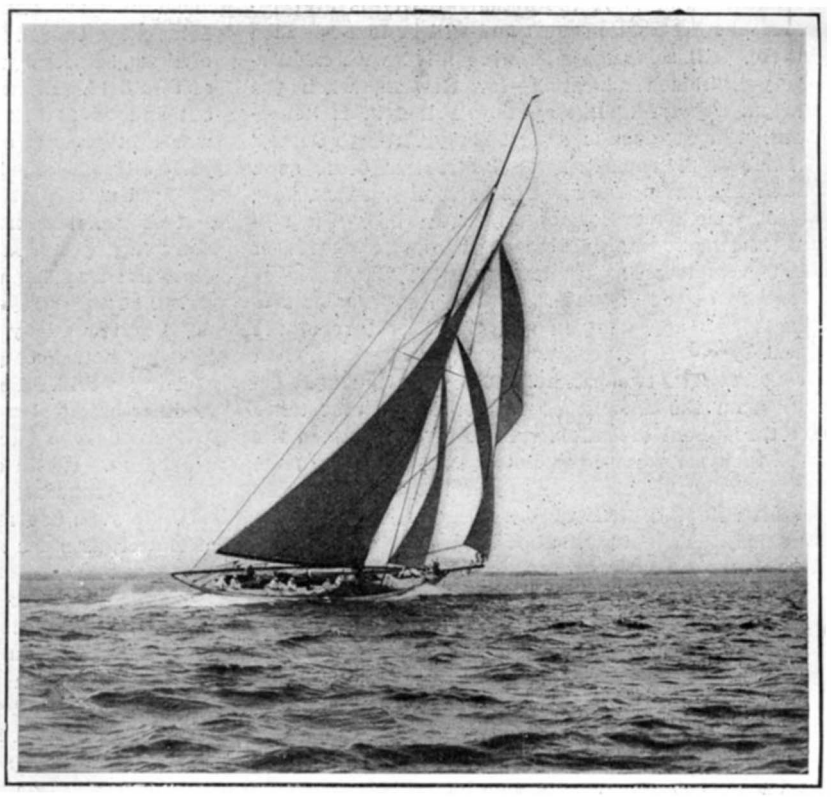


Length on Water-line, 70 feet.

Sloop "Rainbow." Disabled.

Length on Water-line, 56 feet.

Sloop "Weetamoe." Entered, Did Not Race.



Length on Water-line, 70 feet.

Sloop "Yankee." Fourth Position.

CRUISE OF THE NEW YORK YACHT CLUB.—COMPETITORS FOR THE KING'S CUP.

THE ELECTRIC CAR EQUIPMENT OF THE LONG ISLAND RAILROAD.

BY W. N. SMITH.

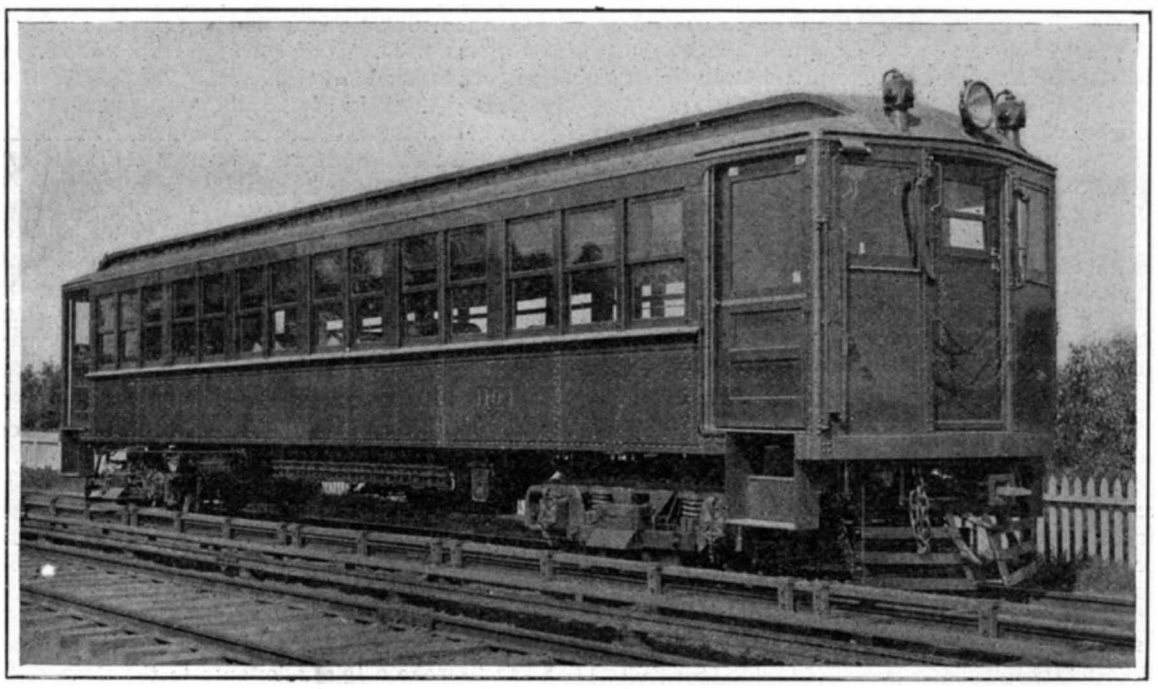
The design of the car equipment of the Long Island Railroad is based upon a careful study of the traffic conditions as they were outlined by the railroad officials at the commencement of the undertaking, calling for trains with the number of cars varying from two to six per train at different hours of the day in regular operation, while heavy excursion travel to the beaches and racetracks would, occasionally, require trains of ten or twelve cars. Some of the service is express and some local. It was deemed of the greatest importance to provide a single type of equipment that would be uniformly available for all the varying conditions of train service.

The maximum possible speed for express runs can be made when all the cars of a multiple-unit train are motor cars. Ordinary schedule conditions, however, usually permit a portion of each train to consist of trailers, and the most severe conditions of frequent stops can be met if the proportion of trailers is not more than one trailer to two motor cars. A considerable saving in the weight of the entire train is thus possible without exceeding either the tractive power of the motors or their ability to radiate the heat developed by the frequent accelerations which are the severest tax upon their capacity.

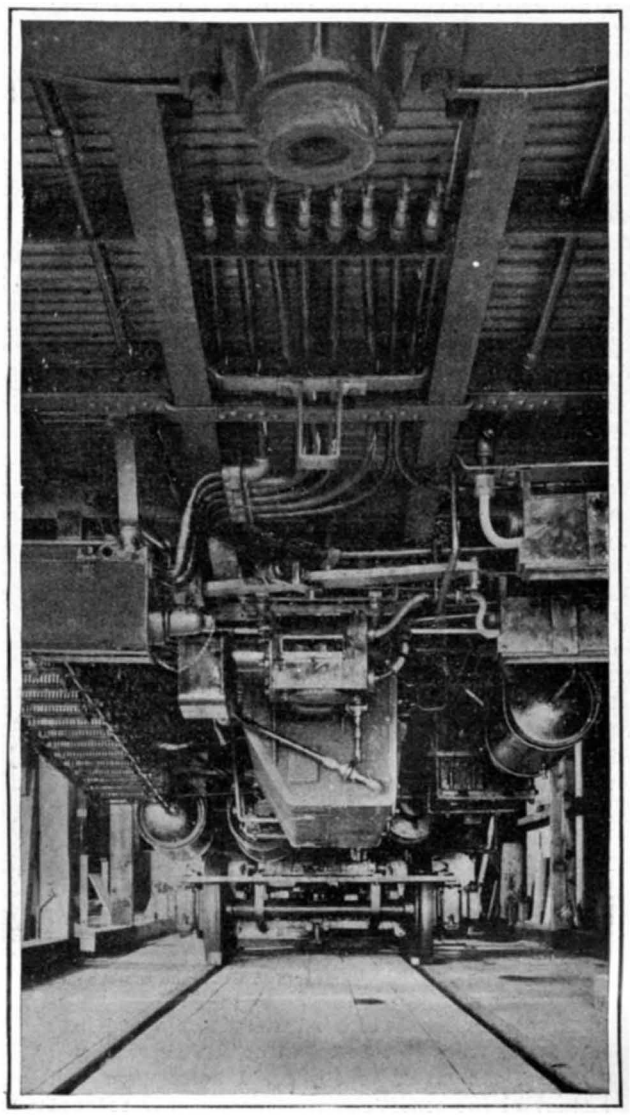
The fact that the Atlantic Division is partly in a subway and the need for interchangeability with the rolling stock of the Interborough Rapid Transit Subway has much to do with the design of the cars. The complete success of the first all-steel passenger cars ever built, and which were designed by Mr. George Gibbs of the New York Subway, led him, in his capacity of Chief Engineer of the Long Island Railroad electric conversion, to advocate their use on this road as well. To the Interborough Rapid Transit Company and the Long Island Railroad Company belongs, therefore, the distinction of being the first railroads in the world to adopt this radical departure in car construction, thus insuring to the public complete immunity from the danger of fire in cars equipped with apparatus carrying powerful electric currents.

The standard third-rail shoes on the Long Island cars are of the hinged slipper type supported on the usual wooden beam which is clamped against the notched face of the equalizer spring seat castings, providing means for vertical adjustment. Trains from the Brooklyn Rapid Transit Company's elevated lines operate over the Atlantic Avenue and Rockaway Beach Divisions by way of Chestnut Street Junction to Rockaway Park. The Brooklyn Elevated line has been for some years operated by the third rail, but the location of the rail is 22¼ inches outside and 6 inches above the track rail, while the Long Island Railroad third rail is 26 inches out and 3½ inches up. This made it necessary to devise some form of adjustable third rail shoe which would operate with equal facility over both third rails and be able to change from one to the other at reduced speed without requiring attention on the part of the motormen or train crew. Such an arrangement has been worked out and patents on it have been applied for by Mr. James C. Boyd. It consists essentially of a hinged slipper type of shoe, mounted upon a movable lug which is held in either position by means of coil springs and is actuated by an arm that engages with the stationary cam mounted alongside of the track in line with the third rail. The movement of the car past this cam in one direction changes the shoe from the inner to the outer low position, while a reverse movement of the car past the cam changes it from the outer to the inner raised position. These adjustable shoe equipments have been fitted to such cars of the Brooklyn Rapid Transit Company as are to operate over the lines of the Long Island Railroad.

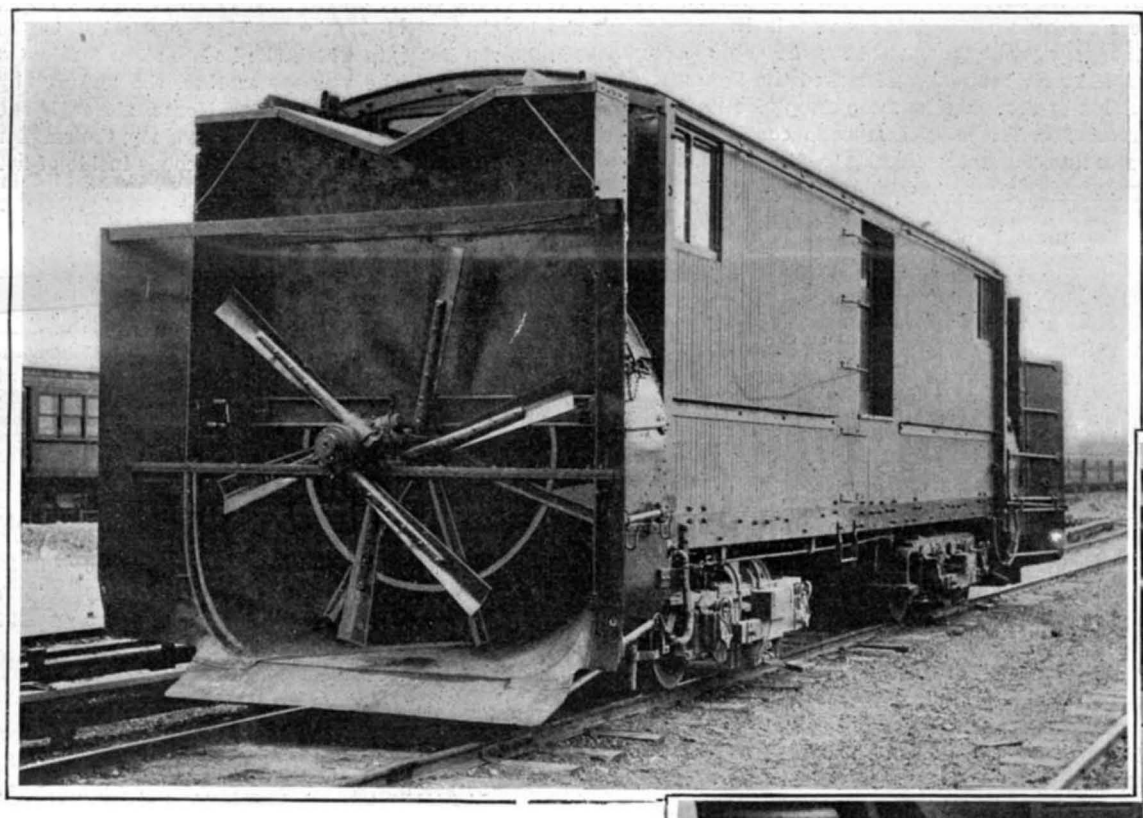
The cars are equipped with hand brakes and with the improved Westinghouse quick service automatic air brake. The quick service application is obtained by venting the train pipe air into the brake cylinders,



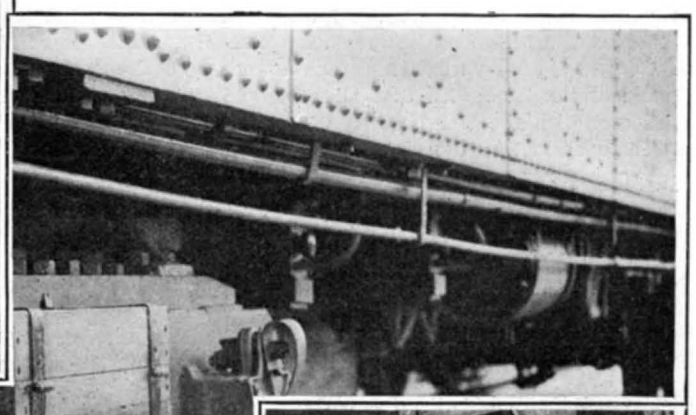
All-Steel Car Used on the Long Island Railroad.

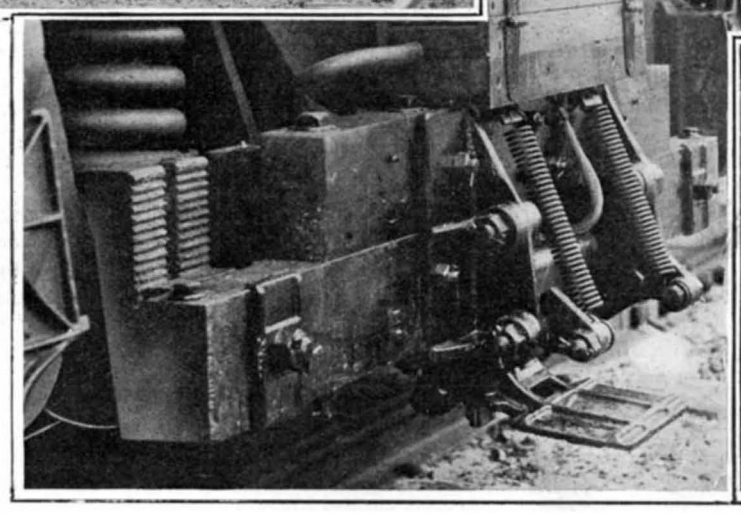


A Motor Car as Viewed from Underneath.

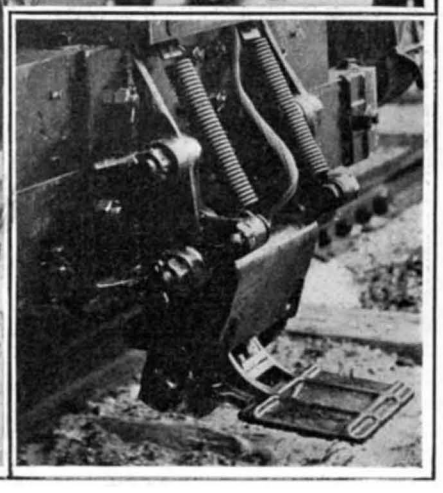


One of the Snow Plows.





Adjustable Third-Rail Shoe in Inner Position.



Outer Position.

THE ELECTRIC CAR EQUIPMENT OF THE LONG ISLAND RAILROAD.

in each service application, in the same way as is done in the quick-acting brake in emergency. The time required to fully set the brakes in service is, in this way, reduced approximately one-half, as compared with the usual apparatus. The cylinder pressure can also be gradually reduced by any desired amount just as with the old straight-air system. This is made possible by a special arrangement of ports in a triple valve and a partial release of the air from the cylinder is effected by slightly raising the train pipe pressure through the motorman's brake valve. The quick-charging of auxiliary reservoirs is done by providing an additional supply port in the triple valve connecting the train pipe on each motor car with the main reservoir through the feed valve. When the brakes are released the train pipe and auxiliary reservoirs are supplied from all the main reservoirs of the train, thereby permitting the auxiliary reservoirs to be charged at the rate that makes it practically impossible to deplete the effective pressure as long as the main reservoirs are supplied by the compressors.

The selection of the electrical equipment of the motor cars, whether operated singly or in trains, requires the most careful study of the loads to be handled, the schedule conditions under which the apparatus is to be operated, and the limitations of the apparatus itself. Whether all cars of a train should be motor cars; whether all axles of the motor cars should be equipped; what the motor characteristics, the ratio of gearing, and the wheel diameter should be; the maximum speeds that could be depended upon to make up time, and the amount of time to be allowed for "lying over" at terminals were, among others, considerations of the utmost importance in coming to a decision on the equipment that would most economically serve the purposes of the Long Island Railroad suburban lines. The variable number of motors and trailer cars per train caused some variation in the load per motor on different trains. There were also various classes of express and local service to deal with involving different schedule speeds and average lengths of runs between stops, for all of which it was desirable to provide a uniform equipment, so that any car could be devoted to any desired type of service without discrimination. Careful investigation showed that the greatest flexibility would result from two-motor car equipment, using the most powerful motors practicable. The limitations were mainly the dimensions imposed by the largest trucks that could be operated under the conditions prescribed by the tunnel and curve clearances which restricted the wheel base of the motor truck to 6 feet 8 inches. This restricted the size of the motor to about 200 horse-power and the study of the conditions was consequently reduced to an examination of the characteristics and gear ratio most suitable for this motor and of its power of endurance to resist overheating. At the outset a series of speed tests was made on various steam trains of the Long Island Railroad in order to compare the actual running time with that laid down in the time tables and with the times which the railroad officials desired to be met by the electrical equipment. An ordinary passenger coach was fitted with speed-recording devices, and a number of speed curves were obtained. These tests also threw some light on the time to be allowed for various delays to which the trains were likely to be subjected, and, together with the actually derived speed curves and calculated best performance curves, showed the relation between the schedule time ordinarily allowed for a train on a given run, and the best time that it could possibly make over the same distance. An idea of the scope of the problem may be had from the statement that there had to be compared about twenty-three different types of train runs, local and express, on eight different routes, with the average distance between stops different in practically every case.

The work of determining the equipment of any system, particularly one so extensive and interconnected as that of the Long Island Railroad, begins, therefore, with the railway motor performance as the principal starting point, and when the train requirements have been worked out carefully the determination of the rest of the equipment is a matter of detailed computation. The general fitness for its work of the equipment actually selected, as proved by the operating results, has justified the care that was taken to work out the problem in a consistent and logical manner.

The motors are of the Westinghouse type, both mounted on one truck. The cast steel frame is split at an angle of 45 degrees, horizontally, the axle bearing being in the lower half. The armature can be taken out without removing the motor from the truck by lifting off the top half of the frame, or the motor can be lifted entire from the truck by removing the gear case and axle caps. A nose suspension with safety lugs which engage with the truck transom is employed for this motor. Access to the brushes and brush holders is provided through an opening in the frame over the commutator, which extends down well over the axle making it easy to inspect the motor from the pit. The commutator cover is perforated, and openings in the bearing housings at the pinion end provide for ventilation, which is practically effected by air being drawn in at that end and thrown out through the ventilating cover over the commutator, forming a continuous draft through the motor.

The Westinghouse electro-pneumatic multiple control system was adopted for the cars of the Long Island Railroad. The advantage of air pressure as an actuating force for making and breaking switch contacts is that it permits an application of considerable power at the contact with relatively light and simple means consisting simply of a piston working in an air cylinder making contact by air pressure and breaking it by a powerful release spring when the air is exhausted. Contact is thus made certain and welding is prevented at the contact points with the very heavy operating currents that have to be carried. The use of storage battery currents for controlling the main switches removes the necessity for using line current at 600 volts in the control system, and further, relieves it from any bad effects that can result from a fluctuation of the potential on the system. The automatic feature of operation is of importance in securing a regular progressive action of the switches independently of the manner in which the motorman may handle the controller, or of any accident that may happen to the train line. The switches are moved only in a certain predetermined manner through a system of interlocks, and the operating current is limited to a certain predetermined amount insuring a rate of acceleration that is automatically kept constant, which results in maximum comfort to the passengers and a minimum of wear and tear.

THE RACE FOR THE KING'S CUP.

(*Continued from page* 112.)

inches. We give these dimensions for comparison with those of "Effort" to show, in a rough way, the effect of the new rule; for, although the "Weetamoe" is 9 feet shorter on the water-line than the "Effort," she has the same beam and 6 inches more draft.

Another new yacht that sailed for the cup, although she was built for cruising and lacked the lightness of construction of the racer, was the sloop "Irolita," built by Herreshoff. She is of composite construction, 65 feet water-line, 90 feet on deck, 18 feet beam, and 9 feet draft. She carries a centerboard for windward work.

There were altogether seventeen entries for the King's cup, and they ranged from the old cup defender "Vigilant," now rigged as a yawl, with a rating, under the new rule, of 92.20, down to the little sloop "Boris," with a rating of 48.40. That only nine out of the seventeen should have started is greatly to be regretted, for where all the yachts entered, as in this case, are the work of well-known designers and are properly handled by skillful skippers, professional or amateur, the interest in a race may be said to be directly as the number of entries. Moreover, the method of rating and handicapping is evidently a liberal one, and affords an excellent inducement to the smaller yachts to push through a long race of this kind and do their best to win. It is stated that the reasons that withdrawals were so many were two: first, that the day was thoroughly disagreeable; secondly, that in the rather fresh breeze that was blowing, many of the older and the smaller yachts considered that they had no chance to win. There was a time in yachting when owners were perfectly ready to cross the line in the interest of the sport, and sail their yachts for everything that was in them, even though they knew that the chances of victory were small. Moreover, it will be an unfortunate day for yachting when lowering skies and a dash of rain prove sufficient to keep one-half of our yachts at their moorings, especially on an occasion like this, when a famous trophy is to be contested for.

Of the yachts which sailed the race, the most famous, of course, is the yawl "Vigilant," a bronze boat built in 1893 to defend the America cup against "Valkyrie II." She is 86 feet 3 inches on the water-line, 126 feet on deck; her beam is 26 feet, and her draft 14 feet 5 inches. Next in historic interest to her is the "Corona," formerly the steel sloop "Colonia," built in the same year as "Vigilant" for the defense of the cup. She is 85 feet 6 inches on the water-line, 123 feet on deck, 24 feet beam, with a draft of 14 feet 10 inches. After the trial races in which "Vigilant" was selected, the "Colonia" which, as a sloop, had a tendency to make too much leeway when close-hauled, was provided with a centerboard and rigged as a schooner. For several years she has been the crack schooner of the New York Yacht Club, and only with the advent of last year's schooner "Elmina" and this year's "Queen" have her colors been lowered. The "Elmina" was built last year from the designs of Cary Smith. She is a steel schooner, 87 feet on the water-line, 125 feet on deck, with 25 feet beam and 15 feet 2 inches draft, spreading 10,000 square feet of sail. Another schooner which in her day was the fastest of her class is the "Amorita," a steel, keel-and-centerboard schooner, designed also by Cary Smith and launched in 1895. She is 70 feet waterline, 99 feet 6 inches on deck, 20 feet beam, and draws 12 feet of water. She is owned by Richard Mansfield, who was on board throughout the race. Another schooner that sailed the race is the "Muriel," a Cary Smith boat, built in 1901; 68 feet water-line, 99 feet on deck, 20 feet 5 inches beam, and 12 feet draft. The other two yachts were the famous twin 70-footers "Yankee" and "Rainbow," of composite build (wooden sheathing on steel frames) designed and built by Herreshoff in 1900. They are 70 feet on the waterline, 106 feet on deck, with 19 feet 6 inches beam and 14 feet draft. The "Yankee" was sailed by her owner, Harry Maxwell, and in this race, as in all of those that have preceded it throughout the season, this clever amateur was pitted against the veteran professional skipper Charlie Barr, who sailed the "Rainbow," which is owned by Cornelius Vanderbilt, the Commodore of the New York Yacht Club. In this race, as in many others of the season, Maxwell secured the lead over the "Rainbow." The twin sloops were making an excellent race of it when the "Rainbow" had the misfortune to strike an uncharted rock, shaking up her crew badly, and so severely straining the yacht that she had to be withdrawn from the race.

From a yachtsman's point of view, the conditions for the contest were excellent, though the day was cloudy, with showers of rain. There was an easterly wind of moderate strength, and the triangular course was adopted, giving first 16½ miles to windward, then a reach of 4 miles, and then a run home before the wind of 17 miles. The "Queen," which was sailed by her owner, J. Rogers Maxwell, took the lead soon after the start, and was never headed throughout the course. Although at times she was sailing 13 knots an hour and gained a long lead on the whole fleet, the event showed that she never pulled far enough away from the "Effort" to have the race safely in hand. She had to make a total allowance to the sloop of 20 minutes and 42 seconds. At the end of the 16½-mile leg to windward, she was 9 minutes and 10 seconds ahead of the other; on the next leg, a reach of 4 miles, she beat the sloop 3 minutes 35 seconds; but in the 17-mile run home, in which she had to allow 9 minutes and 15 seconds, she was faster than the "Effort" by only 6 minutes and 43 seconds. Hence, although she crossed the line far in advance of the sloop, the smaller yacht managed to get home just 9 seconds inside of her allowance, and take the cup. The second yacht over the line was the "Yankee," which, although admirably sailed, finished about 10 minutes astern of the big schooner. The third vessel in was the "Vigilant," and then followed the "Elmina." Next in their order to finish were the "Effort," "Corona," and "Amorita," the "Muriel" having withdrawn during the race. The summary of the race is given below:

Yacht.	Start. h. m. s.	Finish. h. m. s	Elapsed Time. h. m. s.	Corrected Time. h. m. s.
Effort	11 30 38	4 22 58	4 52 20	4 06 40
Queen	11 30 43	4 02 30	4 31 47	4 06 49
Elmina	11 33 12	4 11 18	4 44 06	4 20 35
Yankee	11 30 12	4 12 36	4 42 14	4 22 05
Corona	11 33 00	4 27 16	4 54 16	4 28 33
Vigilant	11 31 43	4 13 32	4 41 49	4 29 17
Amorita	11 31 18	5 02 18	5 31 00	4 43 27
Muriel	11 30 53	Withdrawn.		
Rainbow	11 30 25	Disabled.		

The "Effort" beat the "Queen" 9 seconds; "Elmina," 13 minutes 55 seconds; "Yankee," 15 minutes 25 seconds; "Corona," 21 minutes 53 seconds; "Vigilant," 22 minutes 37 seconds, and the "Amorita," 36 minutes 47 seconds.

The Current Supplement.

The excavation of the Pennsylvania Railroad station in New York city constitutes the subject of the opening article of the current SUPPLEMENT, No. 1598. An excellent drawing showing the scope of this vast undertaking illustrates the article. E. W. Wilgert gives some entertaining information on the first railway in America. Some good advice is published on gas-engine ignition. The last installment of Lieut. White's version of the battle of Tsushima Straits, based on information furnished him by men who took part in the battle, likewise appears. W. W. F. Pullen writes on chimney draft. Prof. Leduc has been engaged for some time in investigating the movements which occur in liquids under the influence of osmotic pressure, and the forms which result from a diffusion of the liquids in each other. The results of his experiments are described by the Paris correspondent of this journal. Some striking photographs accompany his text. Perhaps the most important article published in the SUPPLEMENT is one on the effect of the San Francisco fire on tall buildings of that city. The article is written by F. W. Fitzpatrick, a well-known authority, and discusses most exhaustively the effects of high temperature on various forms of structural material. Excellent illustrations elucidate the article. Another striking contribution is one on mosquito extermination in New York State, showing the various forms of experiments which have been used, and how marsh land has been converted into profitable farms.

Correspondence.

A Suggestion for Balloonists.

To the Editor of the SCIENTIFIC AMERICAN:

The failure thus far to construct a balloon which will not allow gas to escape through the envelope, and thus prevent a long-continued flight, leads me to relate an experience of my own in making a protection against atmospheric humidity. Several years ago there was put upon the market an apparatus for lighting gas jets, oil lamps, and lanterns by means of a strip of paper or cloth carrying pellets, which were ignited by friction, when fed under the proper pointed spring, designed for the purpose. These came out in the autumn, and before winter had passed, many were sold and considerable capital was invested in their manufacture. When the humid weather of August arrived, every one failed. The pellets, composed largely of chlorate of potash, would draw sufficient moisture entirely to put them out of commission. India-rubber varnish, copal, and shellac, all failed. Either the varnish destroyed them, or the dampness penetrated through it. Although some preparations would bear a short immersion in water, nothing withstood atmospheric humidity more than a few hours. When the makers brought the problem to me, I forthwith repeated the experiments of those who had failed before me. At last I became sure that metal alone would protect them. It required weeks of study and many failures before I succeeded. The metal must be thin and weak enough not to interfere with the explosion, and without pin-holes, like those seen in common light tinfoil. At a tinfoil factory they made for me, with little trouble, just what I needed, scarcely heavier than paper, and perfectly free from holes. To attach it to paper, I made a cement of boiled linseed oil and copal varnish in about equal parts, and to this added a very small part of a non-drying oil. Castor oil served best. The office of this non-drying oil was to prevent the cement's becoming brittle when dry. After sizing the paper, to prevent absorption, I gave it an even coat of cement, and let it dry until it "tacked," but would not flow. The tinfoil was laid upon this and rubbed or pressed until it adhered. For the purpose I was working for the pellets were printed on the tinfoil, then another sheet of foil was laid over them, in like manner. For a balloon, however, it would only be necessary to give the tinfoil a coat of cement, and when at the proper point, spread the silk, paper, or cloth, whichever was used, and rub it with a brush until it adhered firmly. After this it could be strengthened in any way that seemed best. There may be a better metal than tin for the foil, and as many as two or three layers used, for the weight is trifling. I do not believe a gas-proof bag will be made until metal is used. And this is a practicable way. Anyone who has used rubber tubing for a lamp or gas stove knows that rubber, while probably the best of the gums, is soon penetrated by gas, whatever its thickness may be. As for the durability of my product, I can only say that I have many of the strips, made eight and ten years ago, and that they are as flexible and perfect as they were when new, although no means was used to protect them from moisture or changes of temperature. I hope someone will try this way. I hold myself ready to give any further information, gathered by several years of work in this field.

DEWEY AUSTIN COBB.

Avalon, N. J., August 2, 1906.

Blowing Wells.

To the Editor of the SCIENTIFIC AMERICAN:

In your issue of July 7, 1906, page 4, you publish a short article on "The Vagaries of Wells." In Water-Supply and Irrigation Papers of the U. S. Geological Survey, No. 29, Wells and Windmills in Nebraska, Washington, 1899, our State Geologist, E. H. Barbour, describes certain wells, in substance, as follows: One class of wells found throughout a large part of the State, especially south of the Platte, deserves particular notice. These wells are known as "blowing," "roaring," "breathing," "singing," or "weather" wells. These wells are held in doubt elsewhere, but the fact of their existence is established. In some communities such wells are distinguished at a distance because of the mound of earth heaped up to check the wind. The attention of the writer was first called to this matter by inquiries for explanation of and remedy for the freezing of pipes in wells at a depth of 30, 50, 60, 80, and even 120 feet below the surface. Reports have come in from about twenty counties. The information is derived from land owners, farmers, well diggers, ministers, principals of schools, civil engineers, and students whose fathers own such wells. These accounts agree with personal observations. There are periods when these wells blow out for consecutive days, and an equal period when they are reversed. This is tested with the flames of candles and by dropping paper, chaff, feathers, etc., into the casing to see it blown out by some force, or drawn in. It is further stated that blowing often indicates high or low conditions of barometer, and that some wells blow most audibly when the wind is from the northwest, whereupon water rises to a higher level in the well than before; but when conditions are reversed, air is drawn in. Many observers notice a reverse of the current according as it is morning or evening, and according as the temperature is high or low. During the progress of a low-barometer area over one of these regions, the wind is expelled with a noise audible for several rods. Upon the following of a high-barometer area, the current is reversed. Steam rises from the curbing, melting the snow. After the current is reversed, the thawed circle freezes again. The pipes are often thawed out when the well blows. The periods of most pronounced exhalation or inhalation are coincident with exceptionally low and exceptionally high barometer areas.

He then explains the geology of the country, and draws the same conclusion as did M. Grosseteste, and continues: "The wind may be the cause in some places. At times the friction of the wind is sufficient to drive the water of the Platte across its bed, leaving the north side dry while the south side is flooded. Equilibrium is disturbed. There must be readjustment. In the vicinity water rises in wells, at a distance there is a wave of transmitted energy which can but affect every portion of the underflow of the Platte. This may show itself in a rise of water and displacement of air, and a rise over a wide area might expel a large volume of air."

I have condensed his article considerably. Almost the same article appears in Nebraska Geological Survey, vol. i., 1903. I know of several such wells near here.

RAY G. HULBURT.

Taylor, Neb., July 25, 1906.

Adulterated Food.

To the Editor of the SCIENTIFIC AMERICAN:

I read with interest an article in your esteemed issue of June 16, "The Need of a Pure Food Bill," by Charles Richards Dodge.

It is certainly gratifying to know that the pure food bill has passed the House and Senate, which proves it was neither lost, strayed, nor stolen.

The new pure food law, however, will not be of much value to the community at large unless the State laws are amended so as to conform with it. When this is done, and the law is enforced, and the public educated to the value of pure food, we will have accomplished what has long been desired.

The report made by Messrs. Reynolds and Neill no doubt hastened the passage of this most important of all subjects, the pure food bill.

According to the recent reports of the conditions in the packing houses, man is getting more than the peck of dirt it is said he is entitled to. That there is room for vast improvement in the packing houses cannot be denied, but the sensational reports should be taken with a grain of common sense.

Sensational articles claiming that hundreds and thousands of men, women, and children are dying sudden, horrible, agonizing deaths on account of eating meats that have been colored or preserved are preposterous.

There is a great deal written about tainted and embalmed meats. There could be no chemicals, however, as powerful as embalming fluids, used to preserve meat so that it would be edible. The most common preservatives that are used to preserve meats are sugar, salt, smoke, borax, and boric acid.

The United States Senate investigated the preservative question thoroughly, and after careful consideration it accepted an amendment which will allow borax and boric acid on meats, fish, fowl, etc. This I consider was a wise amendment, as by the judicious use of these mild preservatives, they will prevent meat from becoming tainted. It is the tainted meat that is in condition for the propagation of toxic germs, which are so dangerous to human health, especially during summer months.

Articles that are preserved with a mild, innocuous preservative should not be deemed adulterated. It is not the custom to adulterate food by adding something to it that will *better* its condition. Adulterated food is invariably mixed with some *inferior* substance, which reduces the food value. A preservative would enhance the food value.

When the pure food law is enforced, it will compel the manufacturers of food stuffs to label their products. The label, however, will be of no value unless the consumer peruses it and is benefited thereby. The labels will be of great benefit to those who are careful with their diet. The masses of mankind, however, are peculiar creatures. They have educated their palates to crave pickles, candies, and highly-seasoned foods, which are not conducive to aid digestion.

When the public learn the value of simple food and the value of balancing their rations, masticating their food thoroughly, breathing deeply, exercising every day, and sleeping seven or eight hours, they will have less cares and troubles and enjoy life as normal persons should.

All we have to build and sustain our body is what we eat, drink, and breathe. Consequently, it behooves each and every one of us to pay more attention to the quality of food, water, and air we consume. The better material we use to build up our bodies, the better, stronger, healthier bodies we will have.

New York, June 30, 1906. H. H. LANGDON.

Aeronautical Notes.

While the French have tired of balloons and are now experimenting with aeroplanes and dirigible airships, here in America one or two enthusiastic amateurs have just started in to try their hand at ballooning. Dr. Julian P. Thomas, of this city, has made several ascents of late, the longest of these being a night journey above Long Island Sound. The start was made from the gas works in 118th Street at 8:30 P. M. on Sunday, the 5th instant. A southwest wind carried the balloon, the "Nirvana" (of 50,000 cubic feet capacity) straight up the Sound. A landing was made in a farm yard at Noank, Conn., at 5 A. M. the next day, to procure food and water. A distance of 140 miles was covered to this point. Owing to the sun expanding the gas, the balloonists were enabled to rise to a greater altitude than before. As they soon approached the ocean, however, they were obliged to land, which they did in a marsh near Brant Rock, Mass., at noon on August 6. The total distance covered was 225 miles. Dr. Thomas was accompanied by Roy Knabenshue, of airship fame, and during the trip the aeronauts made a successful test of a new guide rope.

The French permanent aeronautic commission has clearly defined the different words used to designate apparatus employed in the new science of aerial navigation. In the first place "aéronef," or "appareil d'aviation" (aviation apparatus) means an apparatus heavier than air, of which there are several kinds, such as (1) L'Hélicoptere (helicopter), which is an aéronef which consists essentially of one or several propellers which assure sustentation and progression. (2) L'Aéroplane (aeroplane), an aéronef in which the sustentation is assured more especially by one or more flat or curved surfaces. (3) L'Orthoptère (orthopter) or mechanical bird, i.e., an aéronef sustained and propelled by beating wings. The word "aviateur," which is often improperly used, should be employed only to designate the person operating an aviation apparatus, as the word aeronaut designates a person who goes up in an "aérostat" (balloon or airship using a gas bag).

Automobile Notes.

The Automobile Club of America will this year hold its annual exhibition in the Grand Central Palace, New York city, the first week in December. The Licensed Association of Automobile Manufacturers will hold a show in Madison Square Garden in January, as heretofore.

A. Lee Guinness, a wealthy English amateur driver who purchased the 200-horse-power record-breaking Darracq racer that made a flying kilometer at Ormond last winter in 19 2-5 seconds, recently reduced this record 2-5 of a second with the same car on the beach at Ostend, Belgium. The new time is equivalent to a mile in 30.59 seconds, or a speed of 117.68 miles an hour.

The Automobile Club of France has lately published the regulations as regards the next annual Automobile Show, which is to be held at Paris. It will last from the 7th to the 23d of December. The Exposition of this year promises to be a greater success than ever, and one of the main reasons for this lies in the fact that the immense space of the Esplanade des Invalides, which lies across the Seine from the Grand Palace, is to be utilized this year to contain part of the exhibits. Last year's show, not finding enough space in the Grand Palace, made use of the adjacent Horticultural Buildings, which were quite filled with exhibits. This space is now too small to meet the demands, so that the use of the extensive grounds of the Esplanade, which give an unlimited space, was quite in order. No doubt several temporary structures will be erected here, with a large area for the stationary motors and heavy hauling cars. In connection with the show a touring event has been organized over a circuit which will run through the south of France to the coast. As regards the Show, the rules are about the same as for last year. One point to be noted is that owing to the great number of exhibits of automobile cars, it has been decided to exclude all bicycles or motor-cycles from the main exhibits of the Palace. The annex buildings outside of the Palace will contain heavy-weight cars, motors, combustibles and the aerostatic exhibits. Demands for space should be addressed before September 20 to the Commissariat General of the Exposition, at the Automobile Club's headquarters, 6 Place de la Concorde.

Cadmium gives protective coatings for iron much superior to zinc. The coat has the same aspect as zinc, but is much more adhesive, and harder.

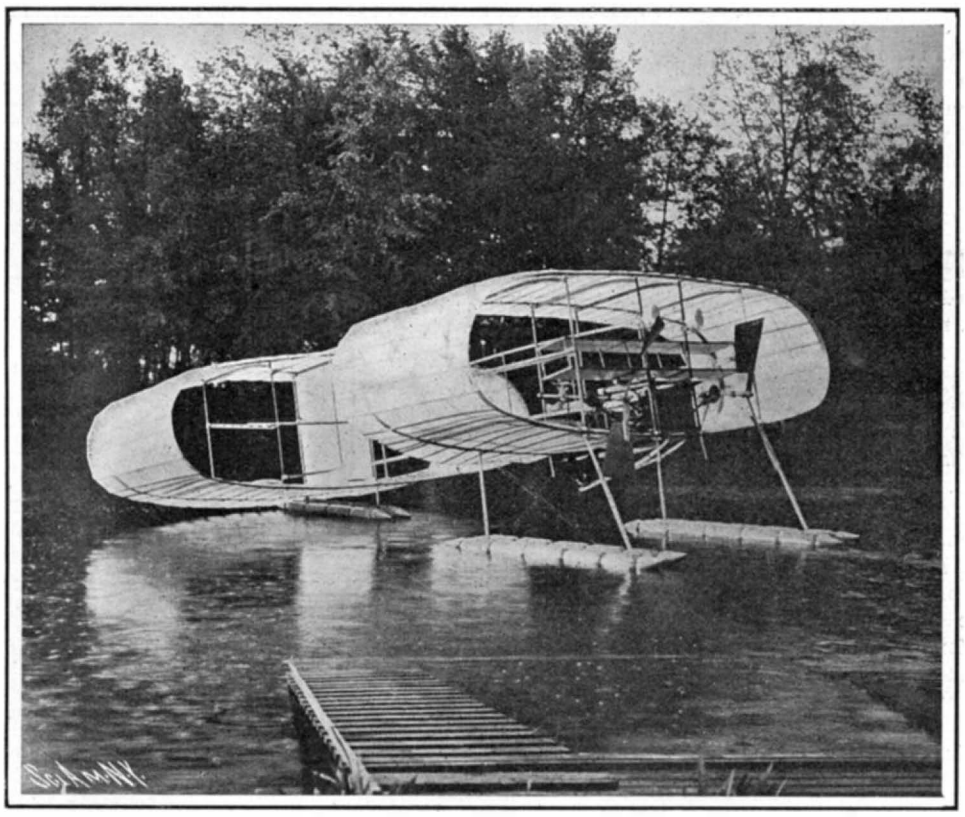
RECENT AERONAUTICS AND AIRSHIPS IN FRANCE.

BY THE PARIS CORRESPONDENT OF THE SCIENTIFIC AMERICAN.

In France, and especially in the vicinity of Paris, there is great activity at present in the matter of airships and aeroplanes, and many are the new apparatus which are under construction at different places. It is mostly in the suburbs of the city that the new airships are being built and put through their experimental flights. Some of these have been only begun, or are at least in the first stages, while others are quite finished and have now made the first trials. The movement in favor of aeroplane apparatus is more strongly marked this year. Heretofore but few such flying machines have been produced, as most of the aeronauts directed their attention preferably to airships. It is no doubt due to the success which the Wright and other aeroplanes have had in America that the aeronauts in France are now taking up the subject, and some interesting developments are to be expected in this line.

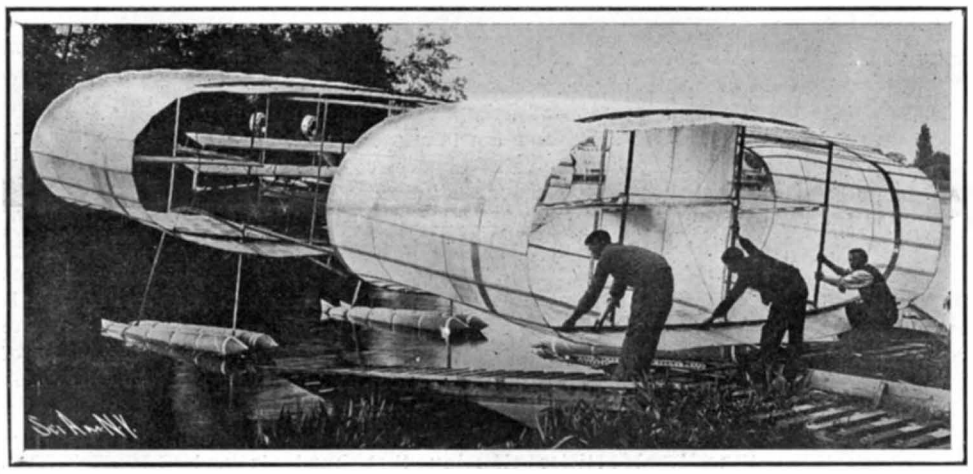
Perhaps this year we may see some successful flights with aeroplanes in France, seeing that aeronauts such as Tatin, Capt. Ferber, Archdeacon, and, more recently, Bleriot and Voisin, Florencie, and others at Paris, as well as Barlatier and Blanc at Marseilles, are now at work bringing out their machines, while the Prince of Monaco is furthering the enterprises of M. Léger. What has greatly stimulated the aeroplane work has been the founding of the Grand Prize of Aviation by the Aero Club of France. For this purpose the sum of $10,000 has been very generously subscribed by Senator Henri Deutsch and M. Ernest Archdeacon. M. Deutsch, it will be remembered, already founded the prize for airships which was won by Santos-Dumont in his memorable flight around the Eiffel Tower. Following the announcement of the prize we find a number of entries from the leading aeronauts, commencing with Santos Dumont, who enters his new helicopter, and followed by M. Florencié, with an *orthoptere* or flapping-wing apparatus resembling a bird in flight. Then we have M. Bellamy, with a new aeroplane, and Messrs. Bleriot and Voisin with the apparatus which we illustrate here. M. Léger's aeroplane, which is being built with great secrecy, will no doubt also be entered for the prize.

As regards the new aeroplane which Messrs. Bleriot and Voisin are constructing at their establishment in the suburbs of Paris, we present here a view of the aeroplane which was taken during the first experimental flight upon the Lake of Enghien. But a short flight was made, however, as it was found that some alterations were needed in the apparatus. The Bleriot aeroplane is formed of two elliptical parts which are built of canvas stretched upon a frame of light wood. A supporting surface of 60 or 70 square yards is given by the two frames. The surfaces are formed of varnished French silk. In front of the foremost elliptical frame are placed two 6-foot propellers, which are driven at a speed of 600 revolutions per minute when in flight by means of an exceptionally light gasoline motor known as the "Antoinette." This motor, which, as used in a high-speed motor boat, was illustrated in our last Motor Boat and Sportsman's number, has 8 cylinders fitted in V-shape upon a long aluminium crank case. It will give 24 horse-power, and, as it is one of the lightest gasoline motors which has thus far been constructed, it marks in itself a great advance in the question of aviation. The propellers produce a tractive effort of 170 pounds. Each has a separate flexible shaft running from the motor and driven through gearing, while clutches allow of disconnecting either propeller at will.



The Bleriot Aeroplane Ready for a Flight Over Water.

The operator is seated back of the forward ellipse with his feet upon bars that control the double horizontal rudder in front. The two propellers are driven by an 8-cylinder gasoline motor of 24 horse-power through bevel gears and flexible shafting. The apparatus resembles somewhat Ludlow's aeroplane.

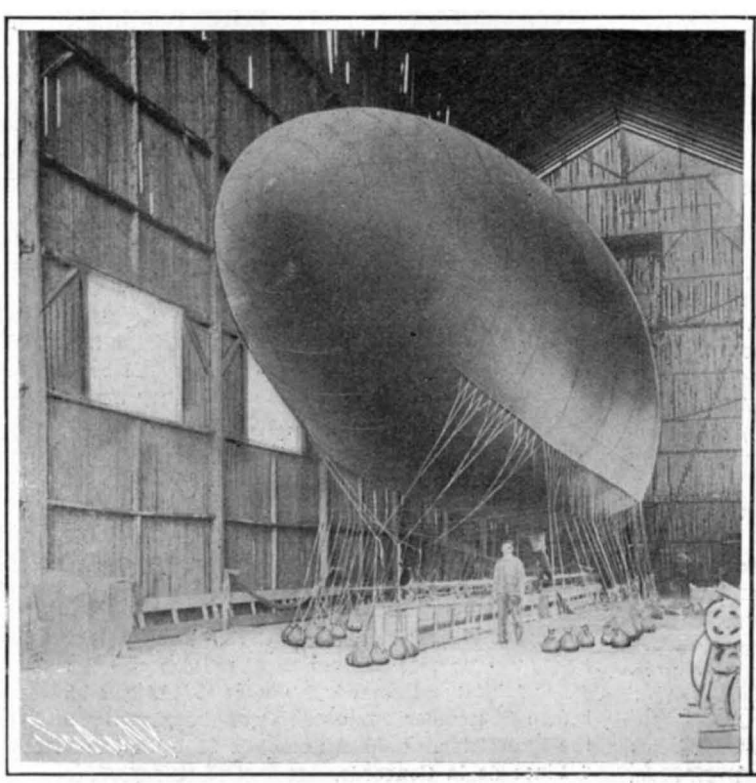


Launching the Bleriot Aeroplane.

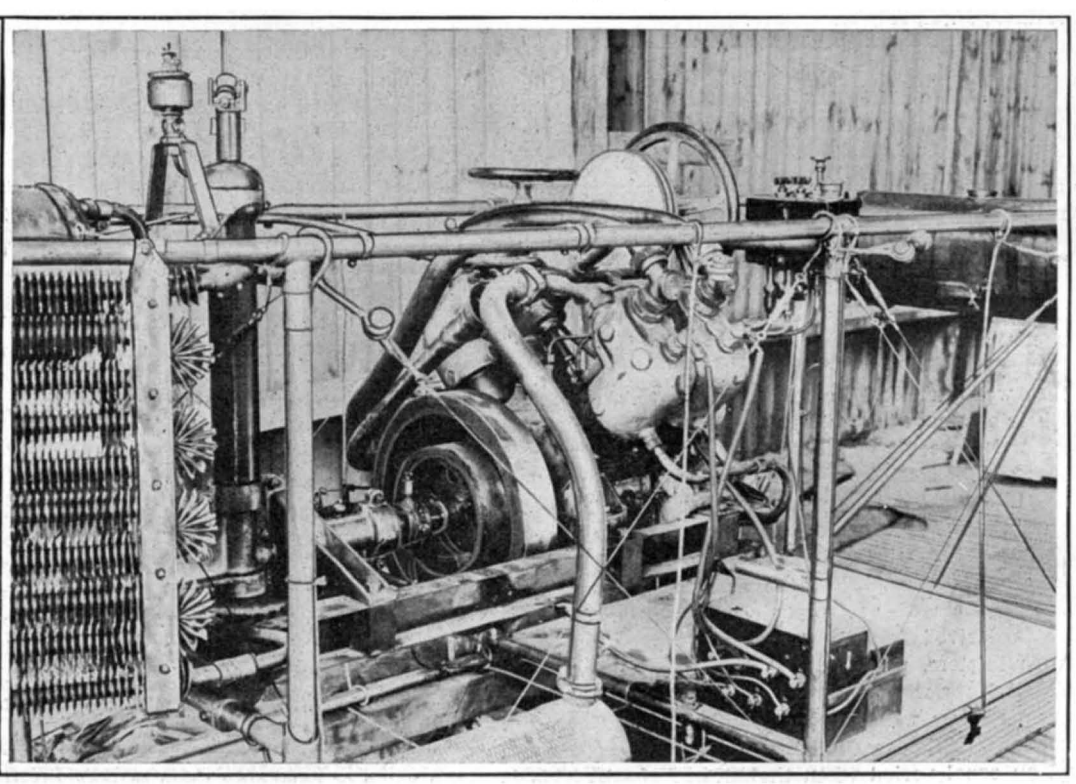
The aeroplane is supported upon floats consisting of cylinders of rubber-covered canvas inflated with air.

The aeroplane is mounted upon detachable floats of rubber-covered canvas filled with air. The Bleriot apparatus has been built with the idea in mind of competing for the Grand Prix, and it is proposed to put it through a series of successive experiments. It has seats for one or two persons. Horizontal and vertical rudders make it quite steady in either direction. One of our illustrations shows the operator with his feet upon the curved bars that control the setting of the double horizontal rudder in front. In a series of trials conducted not long ago in the grounds of the Aeronautic Club near Paris, the aeroplane made a number of flights and seemed to perform very well.

We may mention briefly some of the other aeroplanes which are now in construction, reserving for a future article a more complete and illustrated description. M. Florencie, a member of the Aero Club, is bringing out an aeroplane which is quite different from the above, and consists of two canvas-covered frames resembling wings, attached to either side of a central frame. The wings are made to flap up and down to imitate a bird's flight. One part of the wing is entirely covered with canvas so as to beat the air, while another part is made so as to imitate the action of a bird's feathers, and is formed of a series of longitudinal flaps, fixed at the edges to a wire gauze network, so that the flap is made to close when the wing is brought down, but keeps open when the wing is raised. The middle part of the aeroplane is adapted to be fitted upon the aeronaut's body, and he works the wings by means of stirrups attached to his feet and connected to the wings by cords. Stretching out the legs causes



Count de la Vaulx's Airship is 114.8 Feet Long and 26 Feet in Diameter. It Contains a Compensating Ballonette of 140 Cubic Yards Capacity.



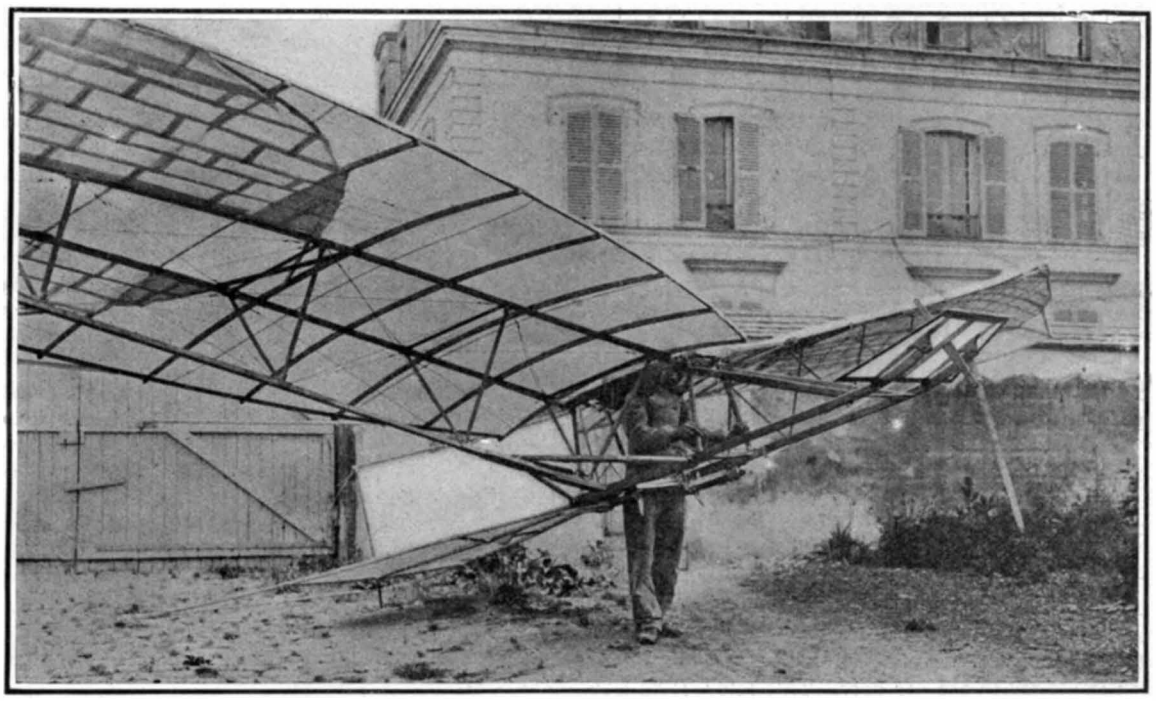
The Airship is Driven by a 4-Cylinder Gasoline Motor of 16 Horse-Power Having Its Cylinders Arranged in Pairs at an Angle of 90 Degrees.

RECENT AERONAUTICS AND AIRSHIPS IN FRANCE.

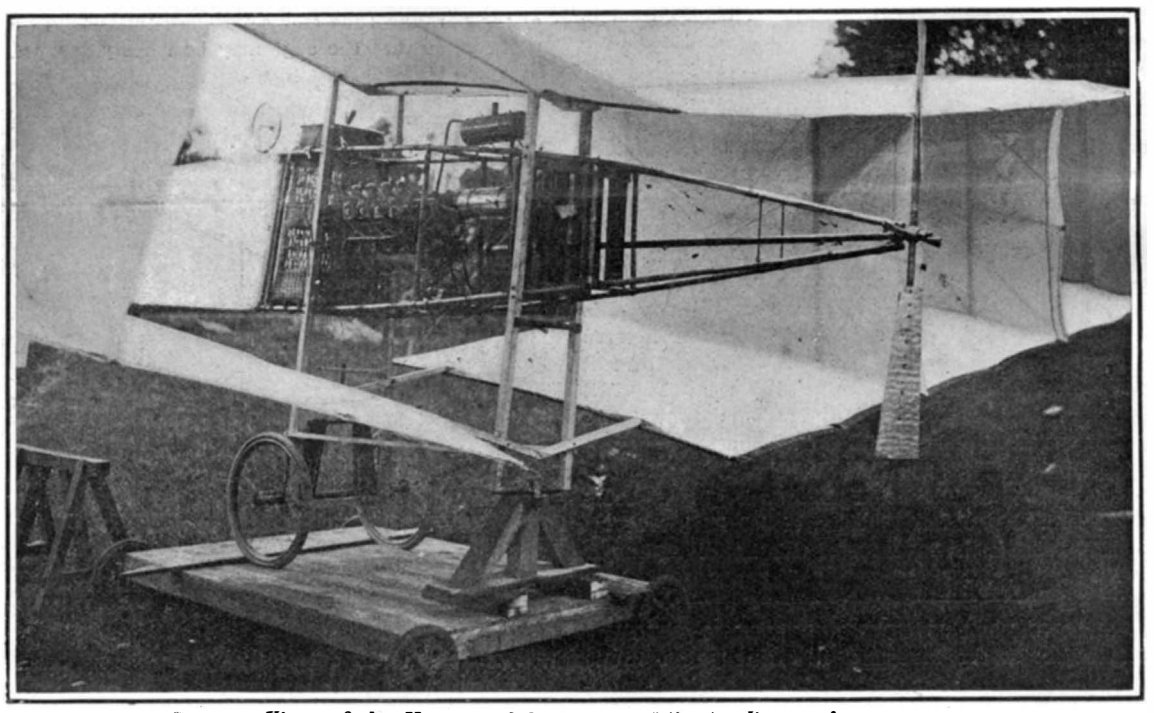
a lowering of the wings, and they are raised by a spring which is fixed to the frame. In front is placed a balancing weight, while in the rear is a rudder forming the tail. The apparatus is 45 feet wide over the wings and the surface is 30 square yards, with a weight of 30 pounds.

Work upon the new aeroplane which M. Léger is constructing for the Prince of Monaco has been carried on for some time past. M. Léger brought out a machine last year which had some success, and this year he is following up his results and making some changes. The first machine was a helicopter, and consisted of two horizontal propellers (one above the other) revolved in opposite directions by a 12-horse-power gasoline motor. On one trial it lifted over 200 pounds net weight. The new machine will no doubt be considerably modified. It is to be tried in France at the Chateau of Marchais, belonging to the Prince of Monaco, and the results of the trials are to be kept secret for the present. At Marseilles, the new Barlatier and Blanc aeroplane is making its trials. An inclined plane which can be turned at an angle is mounted in front, and in the rear are two smaller planes, one on each side, forming the tail. The central framework contains two propellers driven on horizontal shafts by a Buchet gasoline motor. It is expected to carry one person, and at present the machine is being enlarged.

Perhaps the most important of all recent French aeronautic craft is Santos-Dumont's aeroplane. The machine has been christened "14bis," and has been constructed primarily with a view to competing for the $10,000 Deutsch-Archdeacon aeroplane prize, as well as for the Archdeacon cup of $600 which goes to the first man who sails through the air a distance of 25 meters (82 feet) with a maximum angle of drop of 25 per cent, and the prize of $300 for the first aeroplane to go 100 meters (328 feet) with a maximum variation in level of 10 per cent. The "14bis" is built on the lines of a giant bird of prey with the exception that in this case the tail or rudder end constitutes the front of the machine, which consists of a long central body carrying the box rudder and two lateral planes forming a dihedral angle. The aeroplane measures 12 meters (39.37 feet) in width and 10 meters (32.8 feet) in length. It has 861 square feet of sustaining surface. Its weight is 352¾ pounds. This, with Santos-Dumont's weight (110¼) makes a total of 463 pounds. The frame, although smaller than the frames of the Santos-Dumont dirigible airships, is nevertheless designed on substantially the same lines. It supports a two-bladed propeller of aluminium directly driven by the motor at an average speed of 1,100 revolutions per minute. Behind the motor is a radiator of Santos-Dumont's own design. The motor, built by Lavavasseur, is of 24 horse-power, and weighs only 2.64 pounds per horse-power. It is an 8-cylinder V motor of 80 millimeters (3.149 inches) bore and stroke, and 79.36 pounds total weight. Its length over all is 24½ inches, and its width and height 19½. It has automatic inlet valves, jump spark ignition, and develops its rated horse-power at 1,800 revolutions per minute.



The Florencie Orthopter, or Flapping-Wing Machine.

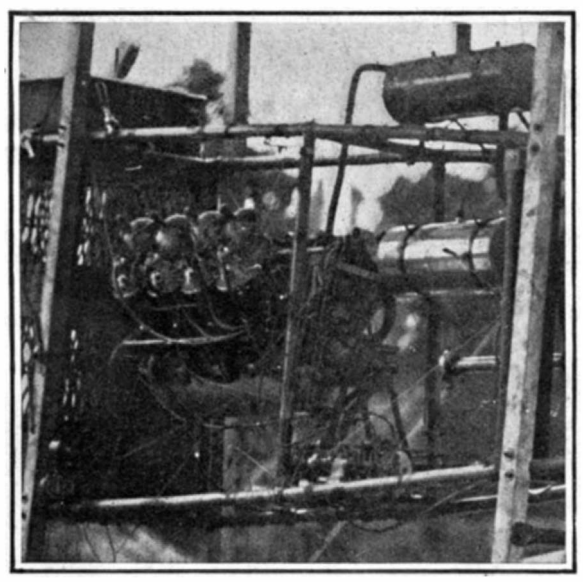


General View of the Motor and Propeller of Santos-Dumont's Aeroplane.

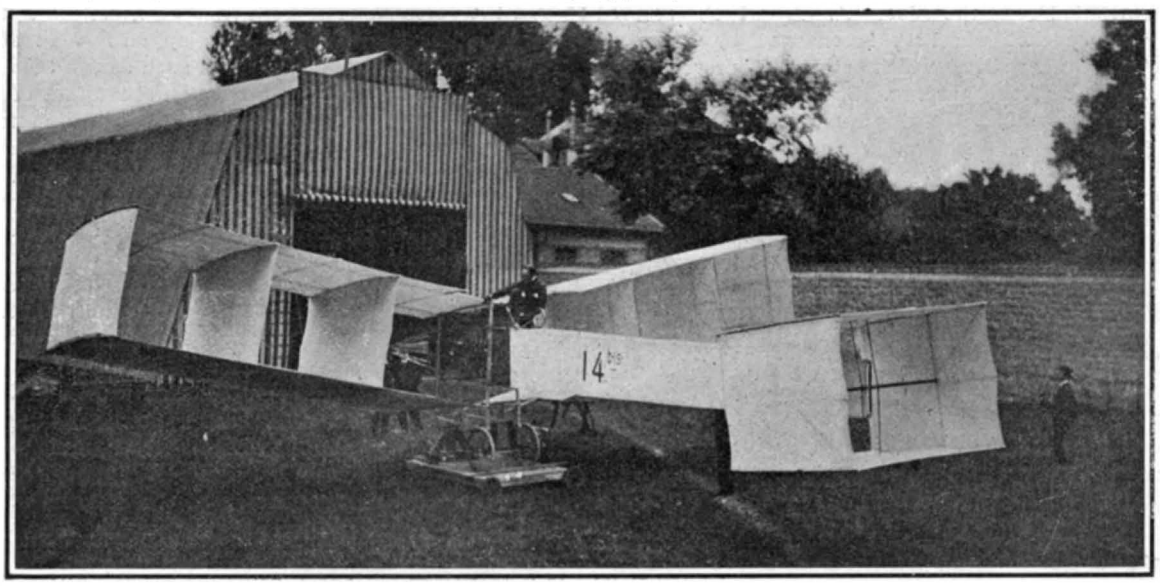
The basket is of the form which Santos-Dumont has always employed in his dirigible airships. This basket is 3 feet high and not much more than 1 foot square. Only a man of Santos-Dumont's slight figure could find it roomy enough. Within easy reach of the aeronaut are the various levers which control the engine, the fuel supply, and the rudder. The latter, which is about 25 feet forward of the motor on the end of a long horizontally-projecting vertical plane, is similar to a huge box kite cell and can be moved in any direction. A small wheel at the aeronaut's right controls the vertical movement, while a lever at his left controls the horizontal. The rudder, as well as the machine itself, is built up of a stiff framework of bamboo and rattan covered with canvas.

The frame of the aeroplane is suitably braced, and is carried on pneumatic-tired bicycle wheels, upon which the entire flying machine is driven at a constantly accelerating speed until it rises spontaneously from the ground. In a recent test, Santos-Dumont used a small dirigible, the aeroplane supplanting the usual car or nacelle. This was fairly successful; but no free flight has as yet been attempted.

The question of airships proper has by no means been dropped. Among others we may mention the new military airship which is to be used by the French government, and which has been ordered by the Minister of War from Messrs. Lebaudy. It will be a modification of the well-known Lebaudy airship, which is one of the most successful so far. The mechanical part is under construction at Paris, while the balloon and the rigging are set up at the Lebaudy balloon shed at Moissan. It will no doubt be used by the War Department at the town of Toul, while the first Lebaudy airship has been allotted to Verdun, both places lying near the German frontier. In the neighborhood of Paris, the new airship built by Count De la Vaulx has received its preliminary trials, during the second of which the Count maneuvered the airship for eight consecutive hours, putting it through all kinds of evolutions with complete success. On the first flight the airship started out well, but it was obliged to alight owing to an accident to the friction clutch of the motor. The photo we reproduce shows a view of it taken at the Aero Club. The cigar-shaped balloon measures 114.8 feet long and 23 feet in diameter. Inside is an air bag, or ballonette, of 140 cubic yards capacity. Below it is suspended a short body the framework of which is constructed of steel tubing. Each end of the body tapers to a point, and in front is mounted the radiator. In the middle is the 16-horse-power, 4-cylinder, water-cooled gasoline motor, which will work the propeller at the end of a long shaft. Back of the motor is a cylindrical gasoline tank.



The Motor of Santos-Dumont's Aeroplane.



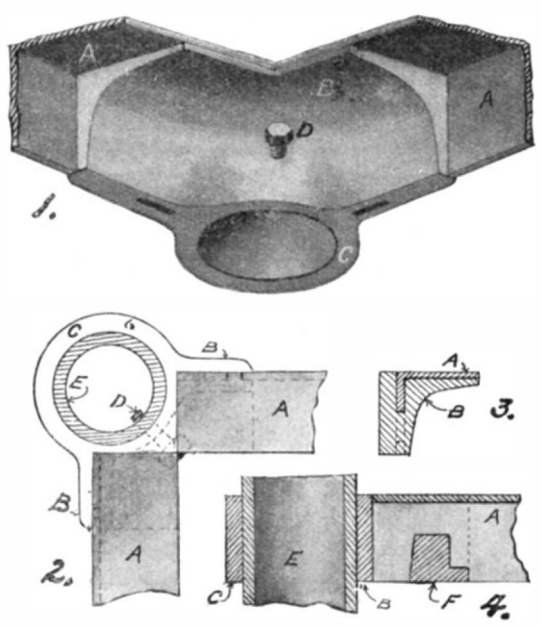
Santos-Dumont's Aeroplane. The Inventor is Seated on Top of the Basket, Just Ahead of the Motor.

RECENT AEROPLANES AND AIRSHIPS IN FRANCE.

Patent Department

AN IMPROVED BED-RAIL JOINT.

A recent invention which is illustrated herewith provides improvements in corner joints or fastenings for the rails of metal beds. The joint is very simple in construction, and can be made cheaply because it does

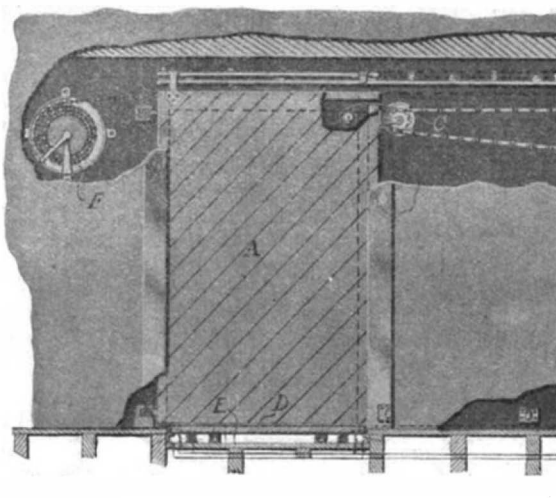


AN IMPROVED BED-RAIL JOINT.

away with the casting on the side rail, and it also reduces the amount of iron in the bracket to one-half or less. Fig. 1 shows the joint double, as used for brass beds. The joint is illustrated as tipped back to reveal the under side. The rails of the bed are indicated at *A*, and the bracket at *B*. It is understood that the bracket can be fastened by bolt *D*, or by pouring the iron around the pillar so as to shrink it on. Fig. 2 is a top view of the double joint. Fig. 4 is a view of the single joint, such as is used for iron beds, showing the slot cut in the rail, also the slightly tapered bridge piece near the bracket. This is shown by the cutting away of the outside face *B* of Fig. 2. Fig. 3 is a cross section of the rail-bearing part of the bracket. The rail is cut off square, and the slot is punched out slightly tapered, to match the tapered bridge piece, which serves to crowd or wedge the rail toward the corner post as it is forced home. The rail is thus readily secured without bolts or screws, and will keep the bed ends vertical at all times, regardless of the weight carried by the bed. It will also be evident that the joint is effected without forging or bending the rail. Mr. James Murphy, of 700 Park Avenue, Kenosha, Wis., is the inventor of this improved corner joint.

AUTOMATIC DOOR OPENING AND CLOSING DEVICE.

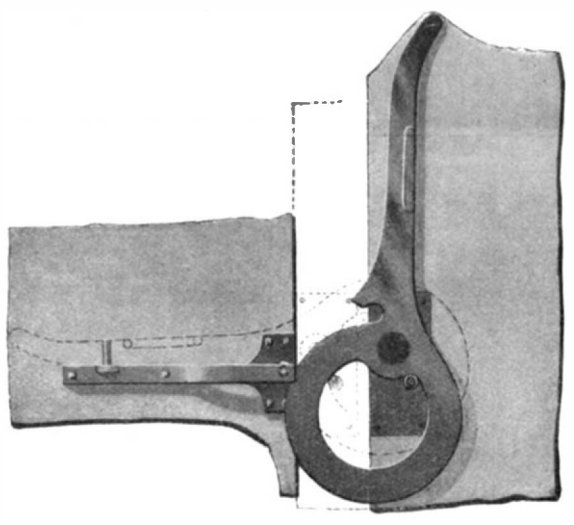
The object of the invention illustrated herewith is to provide an automatic door opening and closing device, controlled by a person walking on a movable platform arranged adjacent to the door. The invention is more particularly applicable to a sliding door, such as a barn door, and the like. In the engraving a door of this type is indicated at *A*. The door is mounted to slide on an overhead track into a pocket in the side of the wall. In this pocket a motor is mounted. The armature shaft is fitted with a sprocket wheel, *B*. A chain on this wheel passes to a second sprocket wheel, *C*, mounted on the door *A*. A wheel, secured to the sprocket wheel *C*, is engaged by a spring-pressed brake shoe, which normally prevents the sprocket *C* from turning. The movable platform, as indicated at *D*, is supported on springs in a recess, *E*, of the floor. The platform is provided with contact plates at opposite ends, adapted to engage similar plates in the recess when the platform is depressed. In this manner the circuit of the motor is closed whenever anyone steps on the platform. The motor then draws up the chain on the sprocket *B*, opening the door. When the door reaches the position indicated by dotted lines, it is stopped by a pair of spring buffers. But as long as the platform is depressed, the motor will keep drawing in the chain; and for this reason a brake is provided, for it permits the sprocket *C* to turn after the door *A* has reached the limit of its motion. As soon as the platform *D* is released the motor stops running, and the door is then drawn back by a spring-operated reel, *F*, acting on a chain connected to the forward edge of the door. The inventor of this novel door opening and closing mechanism is Mr. Cleophas Gamache, of Barre, Vt.



AUTOMATIC DOOR OPENING AND CLOSING DEVICE.

CAR DOOR FASTENER.

The car door fastener which is herewith illustrated is of very simple construction, having no parts liable to get out of order, and being so designed that it cannot be released without breaking the car seal. The invention is particularly applicable to freight cars, and it is so designed that when the fastener is moved in the releasing direction, it will start the door toward its opening position. In our illustration we show the fastener in its open position, while the closed position is indicated by dotted lines. A portion of the car wall is shown at the left, and this carries a bar provided with a slot adapted to receive a lug formed on the latch which is hinged to the car door. This latch, it will be observed, comprises a handle portion on which the lug is formed, and a cam ring eccentrically disposed with respect to the pivot pin of the latch. When the fastener is closed, the handle lies flush with the bar on the car wall. A wire is then passed through an opening in the handle and a lug on the bar, and to this wire the usual seal is attached. Not until this seal is broken will it be possible to open the door. In opening the door the eccentric ring engages an anti-friction roller at the end of the bar, and thus starts the door toward its opening position, so that the edge may be readily grasped by a

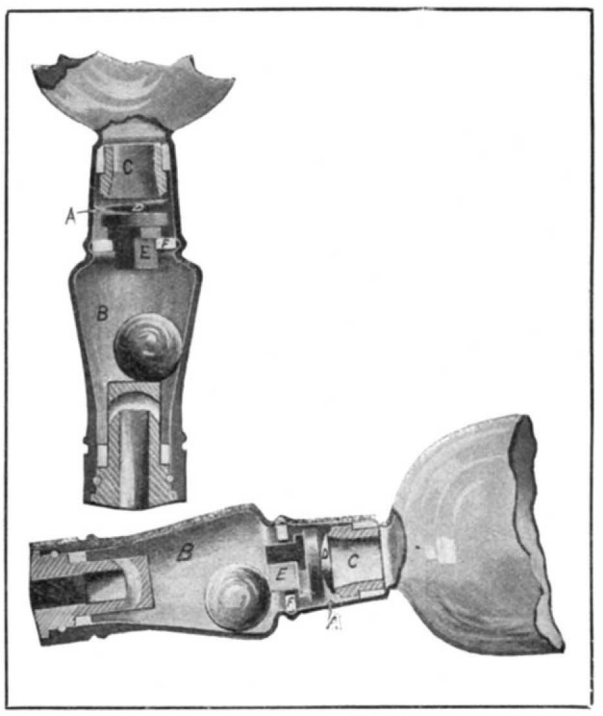


CAR DOOR FASTENER.

person to slide the door fully open. The eccentric ring is formed with an inner projection adapted to engage a stop pin, to stop the member when in the vertical position illustrated. By this arrangement, when the eccentric comes in contact with the anti-friction roller upon closing the door, the fastener will be automatically moved down to locking position. The inventor of this car door fastener is Mr. F. L. Estes, of 27 Bridge Avenue, Nashville, Tenn.

NON-REFILLABLE BOTTLE.

In the accompanying engraving we illustrate a non-refillable bottle, which not only appears to be absolutely non-refillable, but also is of such design that the cost of manufacture is but a fraction above that of the ordinary bottle. In addition to a ball weight, the improved bottle makes use of a float for operating the valve, so that in any attempt to fill the bottle the valve will be closed by the float when the bottle is inverted and by the weight when the bottle is in upright position. This principle is not entirely new, but heretofore bottles of such design could be readily filled if held in a horizontal position. In the new bottle this objection is overcome by a novel construction of that portion of the neck in which the ball weight operates. The neck is formed with a float chamber *A* and a ball chamber *B*. Fitted into the bottom of the float chamber is a glass valve seat, *C*. The valve, also of glass, is shown at *D*. Both the valve and valve seat are ground to provide a perfect closure. The float, which is indicated at *E*, is confined with a small amount of play in its chamber by the collar *F*. The shank of this float projects through the collar, and against this shank the ball is adapted to roll when the bottle is tilted upward. The object of confining the float is to give perfect freedom of movement to the ball, a feature which is a great improvement over previous constructions.

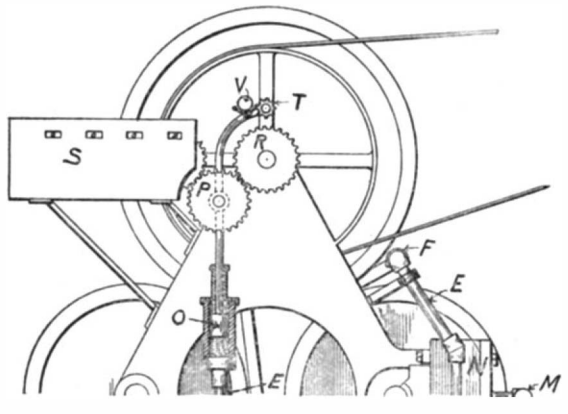


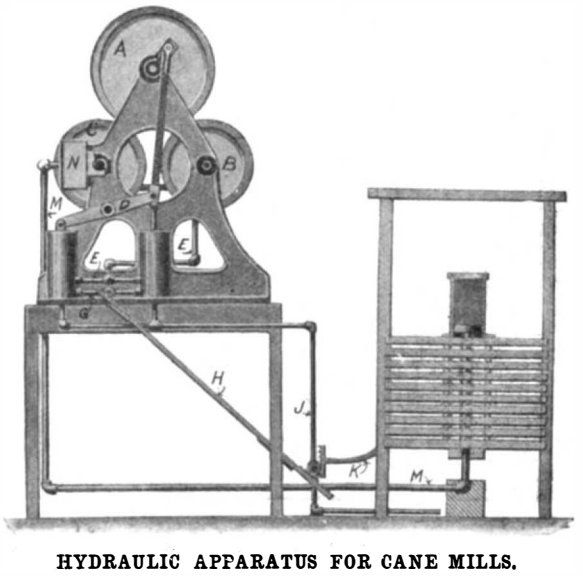
NON-REFILLABLE BOTTLE.

It will be observed that the chamber *B* flares at the bottom, providing an inclined surface for the ball to roll upon. This surface is not a plane surface, but is slightly convex, so that it is next to impossible to balance the ball midway of the chamber. Owing also to the inclination of the wall, the bottle cannot be held in a horizontal, or even approximately horizontal, position without the ball rolling against the float and thereby closing the valve. The top of the ball chamber is closed by a glass plug of such design that it would be impossible to insert a wire into the bottle neck to hold the ball clear of the float. This plug is cemented in place, so that it is impossible to remove it without breaking the bottle. An ordinary cork is used to close the opening through the plug. The inventor of this improved non-refillable bottle is Mr. P. Anthony Brock, 74 Lembeck Avenue, Jersey City, N. J.

HYDRAULIC APPARATUS FOR CANE MILLS.

In sugar-cane mills it is customary to pass the cane through two or more sets of rolls. The first set squeezes out most of the juice, reducing the cane to a sort of trash known as bagasse. The latter is then sprinkled with water and passed through the next set





HYDRAULIC APPARATUS FOR CANE MILLS.

of rolls, which squeeze out this water with the sugar it has dissolved. A recent invention, which we illustrate herewith, provides means for regulating the flow of water through the bagasse, for registering the amount of bagasse passing between the rollers, and for sounding an alarm when the passage of the bagasse ceases. A general side elevation of a mill provided with these improvements is shown in Fig. 1. Three rolls, *A*, *B*, and *C*, are indicated, the roll *A* being driven by a pulley and belt, as shown in Fig. 2, which is a view of a portion of the opposite side of the machine. The shaft which carries roll *A* is provided at one end with a crank connected by a rod with the walking beam *D* of a double-cylinder pump, so that while the roll is turning, this pump will be in operation. Normally the pump serves to force water through the pipes *E* to the sprinkling head *F*. The latter is provided with a spring valve, which may be adjusted to limit the amount of water sprinkled on the bagasse. A pipe *G* connects the two cylinders of the pump, providing a by-pass. The latter is normally closed by a valve operated by the inclined rack-bar *H*. This bar also engages a pinion connected with a valve in the supply pipe *J* of the pump. The pinion also meshes with a rack *K*, connected to a vertically-movable cylinder *L*. The cylinder is slidable on a fixed piston, and is weighted down by a series of detachable weights. A pipe *M* communicating with the interior of this cylinder runs to a pair of smaller cylinders *N*, placed one at each end of the roll, *C*. The shaft which carries this roll is movable horizontally in its bearing, and is connected with pistons adapted to operate in the cylinders *N*. While the bagasse is passing between the rolls, it will keep the roll *C* in its outer position, thus lifting the cylinder *L* by hydraulic pressure, opening the valve of the supply pipe, *J*, and closing the valve of the pipe, *G*. The pump will, therefore, continue to supply the sprinkling head *F*. But as soon as the passage of bagasse ceases, the weighted cylinder will move back the roll *C*, cut off the supply of water, and by opening the by-pass *G* prevent the pump from forcing water into the sprinkling head. On the opposite side of the machine is the recording mechanism. When water is pumped into the sprinkling head it operates to lift a piston, *O*, raising an idle pinion, *P*, into mesh with the gear wheel *R* on the shaft of the roll *A*, and the gear of the recording mechanism *S*. The latter records the number of revolutions of the roll *A* while the sprinkling head is in operation, or in other words, while the bagasse is passing; but when this ceases the pinion drops, disconnecting the gear, while a small pinion *T* is thrown into mesh with the wheel *R*, and rings an alarm *V* to notify the engineer so that he may stop the machine. A patent on this improved cane mill has recently been granted to Mr. J. C. Searle, Lalamilo Post Office, Puako Pthi, Hawaii.

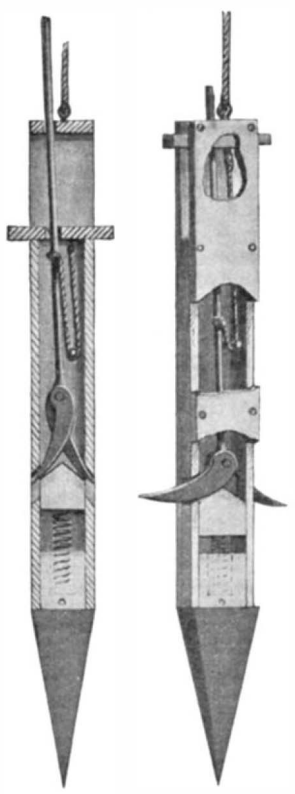
A NOVEL TOBACCO PIPE.

Many inventions have been made from time to time, with a view to preventing nicotine from being drawn up through the stem of the tobacco pipe and into the smoker's mouth. The latest invention along this line, which we show in the accompanying engraving, is a radical departure from all previous designs. The pipe has the appearance of a pear, the bowl being entirely inclosed with the exception of a ventilation opening in the bottom. The body of the pipe is made up of three members, which are threaded together, as indicated in the drawing. The central member contains the bowl proper, or holder. This consists of a sleeve with wire netting over each end. The netting at the lower end is carried in a cap hinged to the tobacco holder. A suitable lining is interposed between the holder and the body of the pipe. In use the bottom section of the pipe body is removed, and the holder is filled with tobacco. The latter is now lighted in the usual manner, and the section screwed on again. The top section of the pipe body is provided with a lining, which will absorb any tainted saliva or nicotine that passes up into the upper section. This lining can be removed at any time and replaced by a new one. As the tobacco is almost completely inclosed, no sparks can pass out, and the pipe is thus rendered perfectly safe in almost any place. A patent on this improved tobacco pipe has been secured by Mr. Neal P. Shulin, of Butte, Mont., Box 1265.

A NOVEL TOBACCO PIPE.

ANCHOR FOR AIRSHIPS.

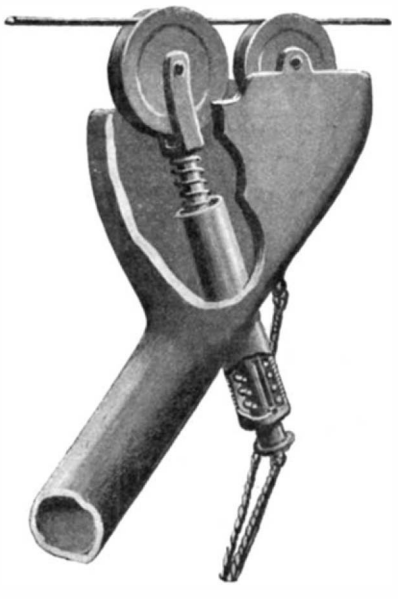
Pictured in the accompanying engraving is an improved anchor for airships invented by Mr. David Thomas, of 2526 Ocean Boulevard, San Francisco, Cal. The anchor is of the harpoon type, being adapted to penetrate into the ground when thrown from an airship, and having prongs or claws which will move out laterally and prevent the anchor from being dislodged. The design is such that the claws will not move out until the anchor has penetrated the ground to a predetermined depth. After the anchor is firmly fixed, the airship may be drawn down by winding up the anchor rope on a windlass. The body of the anchor consists of a hollow boxlike structure shod with a sharp metal point. The point is provided with a shank, which extends upward into the body of the anchor. Fitted in a socket in the shank is a compression spring, which at its upper end supports a slidable guide block. The claws or prongs rest on the guide block, and are hinged to a rod which has bearing in a cap at the top of the anchor. The rope attached to this rod passes under a peg, and is secured to a slidable crossbar near the top of the anchor, as shown in the engraving. The ends of the crossbar project through slots in the anchor body. When the anchor is driven into the ground, these projecting ends engage the surface of the ground, causing the crossbar to rise relatively to the anchor, and thus pulling down the rod and forcing the prongs out through slots in the side walls of the anchor. When it is desired to raise the anchor, enough earth is removed to allow the crossbar to slide to normal position, after which the anchor may be drawn up by pulling on the projecting end of the rod.



ANCHOR FOR AIRSHIPS.

AN IMPROVED TROLLEY.

With the purpose of overcoming the common liability of a trolley to run off a trolley wire, an inventor in Texas has devised the double wheel trolley illustrated herewith. One of the wheels is secured to the trolley harp in the usual manner, while the other is mounted yieldingly therein. The latter, or auxiliary trolley wheel, is journaled in the forked end of a rod which fits in a tube secured to the harp. A spiral spring in the tube and coiled about the rod serves to press the auxiliary wheel outward. Both of the wheels serve as conductors for electric fluid, and owing to the peculiar manner in which the auxiliary wheel is mounted, it retains its true engagement with the trolley wire, irrespective of jumping or swinging of the pole. A cord is attached to the rod which carries the auxiliary wheel, and when it is desired to draw down the pole for the purpose of clearing crossings and overhead structures, this cord should be pulled, so that when the pole is moved down, the auxiliary wheel also moves down in the harp. This avoids entangling the auxiliary wheel with overhead structures when the pole is drawn down. The spring-sustained wheel will bear yieldingly against the wire at all times during the operation of the trolley, and will take from the same the shock incident to vertical movement of the trolley against the wire. Owing to the inertia of the trolley pole, the trolley in ordinary constructions often fails to follow the trolley wire when the latter is set swinging. In the present case the inertia of the auxiliary wheel is inconsiderable, and it will not fail to keep in touch with the trolley wire. It will be noticed that the auxiliary wheel-supporting rod is so mounted on the harp that it moves approximately tangent to the arc of the circle described by the end of the pole, and as a consequence will respond more quickly to the impulse of the spring, and will require less time to pass through the entire extent of movement with respect to the harp necessary to maintain the wheel in contact with the trolley wire than were it mounted to move perpendicularly thereto. The inventor of this improved trolley is Mr. G. E. Ward, Abilene, Texas (Box 28).



AN IMPROVED TROLLEY.

Brief Notes Concerning Inventions.

With a new model of the Colt automatic pistol just placed on the market, a novelty is being introduced in the shape of a holster and stock combined, which greatly enlarges the weapon's sphere of usefulness. Being taken from its case, the weapon may be attached to it and the combination made use of as a shoulder piece, and utilized in bringing down larger game than possible with the use of the pistol alone.

The matter of who is "next" in the barber shop often occasions unpleasant incidents, and the offended person may leave the place, never to return. To obviate these incidents, a mechanical device has recently been invented by which the patrons are summoned in proper order. It consists of a dial secured in a prominent part of the place. The patron has merely to glance at this at such times as his attention is attracted by the ringing of a bell, and when he sees the number which corresponds to that on a check which was handed to him as he entered, he knows it is his turn. This signal is given by the barber whose chair has just been vacated, by touching an electric button placed at a convenient point on the chair or fixtures.

Stone and mosaic floorings have been rendered expensive by the large amount of hand work required in the laying and finishing. After laying as carefully as possible, the method of giving the finish consisted of rubbing it down with a heavy stone and a suitable abrasive, such as sand. This stone was pulled back and forth by two men, and the operation was therefore a tedious and expensive one. A machine has been recently invented and used with great success in this work. It consists of a motor mounted on a four-wheeled truck, with several horizontally-mounted grinding wheels which are driven by the motor. The machine is guided by an operator, who rides upon it. The grinding wheels are thirteen inches in diameter, and are arranged to entirely cover a path thirty-three inches in width. These grinders make two hundred revolutions per minute, leave the floor in a perfectly finished condition, and when at work travel fifteen feet per minute.

William S. Meade, who is said to have made a fortune of $250,000 in a process discovered by him for the preservation of meat, recently died in a New York lodging house, penniless. He originally came from Buffalo, N. Y., and drifted to the West, where he made his meat-preserving discovery. Afterward, while on the Pacific coast, he befriended an old sea captain, who claimed to know the resting place of a sunken treasure boat, and upon the captain's death Meade was bequeathed a number of charts and directions in cipher for locating the craft. Meade's whole fortune was wasted in an effort to find this boat. At his own expense he sent out three expeditions. Two of them came to grief on the coast of South America, and the third was abandoned after cruising along the coast of Chile and Peru for several years in search of the treasure. During the latter part of his life Meade made a living by peddling various articles in New York offices.

It is the common practice of nearly all trolley companies to keep the curves in the track lubricated by an application of grease. This is essential in order that the cars shall not jump the tracks when rounding the corners. The material made use of is a composition of tar, and it is frequently the cause of complaints from passengers and others who get it on their clothing. A suggestion to make use of water in this connection has been under trial at Sacramento, Cal., and it is said to have been successful in every respect. It is proposed to fit out each car with a small water tank, and with an outlet just over the track and in front of the wheels. Upon encountering any deviation in the tracks, this device is automatically put into operation, and a tiny stream of water is directed on the inner surfaces of the track, which is the part that comes in contact with the wheel in making the turn. This is said to answer all purposes. In view of the success of the experiment, a company has been formed to exploit the invention and to introduce it generally through the country.

RECENTLY PATENTED INVENTIONS.

Pertaining to Apparel.

MARKING DEVICE FOR SKIRTS.—MARGARET HALL, Vancouver, Wash. The invention has reference more especially to devices or structures for marking ladies' garments—such as skirts, coats, cloaks, dresses, and the like—on a line at which to cut or hem the garment to derive a hang thereof at the bottom a uniform distance all around from the ground or floor. The device is collapsible and occupies but small space in shipment or transportation or when not in use.

SHOE-HEEL.—R. I. HERRMANN, Roulette, Pa. The invention relates to improvements in heels for shoes, the object being to provide a heel which may be firmly yet detachably connected to shoes, so that the heels may be transferred or substituted one for the other when worn down at one side, thus not only equalizing the shape of the heels, but keeping the footwear in proper form.

Electrical Devices.

TROLLEY.—J. H. WALKER, Lexington, Ky. Various improvements are included in this patent relating to the trolley harp, its connection with the conductor wire of the pole, and the manner of mounting the trolley wheel. It is figured by this inventor that the improvements will prolong the life of the trolley harp and its attachments and result in greater convenience in effecting the necessary adjustments due to wear and usage.

TROLLEY-POLE.—P. DUDLEY, Asbury Park, N. J. The purpose of the invention is to provide a ball-and-socket connection between the fork for the trolley wheel and the pole and a laterally-curved guide and support for the fork, which construction allows the wheeel to accurately follow the wire when the latter is not exactly overhead and also to follow the wire upon all manner of curves, said construction also insuring the wheel being straight upon the wire regardless of the angle of the pole.

TELEPHONE ATTACHMENT.—F. F. HOWE, Cleveland, Ohio. The inventor provides means whereby the swinging spring-pressed carrier may be moved in either direction from its normal position and will when so moved release the rocker connected with the telephone-switch, so that if the carrier be moved laterally in one direction to permit application of the receiver to the left ear or laterally in the opposite direction to permit the application of the receiver to the right ear the rocker will be released in both instances to open the telephone-switch. It is an improvement particularly in that class illustrated in a former patent issued to Mr. Howe.

CORD-SUSPENSION ELECTRIC DENTAL ENGINE.—J. V. TRENAMAN, New York, N. Y. In this case the improvement pertains to means for mounting and manipulating dental engines, and more particularly to the means for suspending the electric motor and its accompanying parts. The device is neat in appearance and materially increases the quality of the insulation as between the wires and other metallic parts.

Of Interest to Farmers.

SHIPPING-COOP.—H. B. FRY and T. B. FRY, Memphis, Tenn. This improvement has reference to shipping coops or crates such as are used for transporting live fowls. The object of the invention is the production of a coop of this kind which is simple in construction and which is sanitary and which is capable of being folded up compactly for return shipment.

CORN-TOPPING TOOL.—F. W. GORDON, Miami, Tex. The object of the inventor is to provide a cutting-tool that may be placed on either or on both hands of the operator and cut corn-heads from the stalks when the heads have been grasped and the tool or tools subsequently manipulated so as to forcibly impinge the sharp edge of a knife that is a part of each tool against the stalk near the head while the latter is grasped, the cut heads being thrown into a receptacle, thus expediting the operation of removing heads of cereals from the standing stalks.

MOWING-MACHINE.—S. D. GRIMM, Concordia, Kan. In this machine the sickle bar is operated by a lever as its fulcrum intermediate its ends, the outer end being connected by a ball and socket joint and pitman rod with the sickle bar and the inner end arranged to engage two rollers each provided with cam grooves so that the rotation of the rollers with suitable gearing giving the desired speed, will effect horizontal rocking of the lever to actuate the cutting devices.

STRIPPING AND CLEANING MACHINE.—E. BEHRENDT, Batangas, Philippine Islands. The object in this case is to provide a machine especially adapted for treating the leaf-sheaths or band-like material stripped off the abaca and like plants and arranged to permit a quick and thorough separation of the pulp and freeing the fibers without injury to the latter, the fibers being completely freed or cleaned of the pulp.

LAND-ROLLER.—S. WARNER, West Union, Ind. This roller is especially adapted for rolling listed corn, being capable of operating upon two or more listed ridges. A purpose of the invention is to provide rollers especially adapted to the shape of the ridges and which will not only roll the top or crown of a ridge, but will also crush the earth at the side edges where it is most needed. Means are provided for adjusting the rollers bodily upon their supports to accommodate them to different-sized furrows made by different-sized listers.

WATER-REGULATOR.—R. J. POWERS, Chicago, Ill. The invention relates to novel means for regulating the water admitted to troughs, tanks, and other receivers by which means to automatically cut off the water-supply when the trough is full. It is particularly adapted for use in connection with stock-waterers; but it is useful in other ways.

Of General Interest.

SLIDING DOOR.—J. S. SCHLOSSER, Chicago, Ill. This invention relates to sliding doors such as used on stables and cars. The object of the invention is to produce a sliding door which is hung in a simple manner, and which may be readily opened and closed, and which will operate to close the doorway tightly when the door occupies its closed position.

BUFFER.—S. M. GOLDBERG, New York, N. Y. The invention refers to a toilet article employed for polishing nails. The principal objects thereof are to provide a device with a buffing-surface which can be readily removed and replaced, so that when worn the entire article does not have to be discarded, also to provide means for securely holding the buffing material upon a base, and to provide a removable handle.

VAGINAL IRRIGATING DEVICE.—V. SALCEDO, Apaseo, Guanajuato, Mexico. One purpose of the invention is to provide a hygienic device for the organs and protecting them during such operation, which device is externally applied and is provided with means for ventilation and introduction of the cannula of a syringe without bringing same in contact with the person and also means for conducting refuse to a distant receptacle, thus protecting clothing and bedding.

LIQUID-COOLER.—F. D. H. KLUHSMEIER, New York, N. Y. In this case the invention pertains particularly to improvements in devices for cooling beer drawn from a faucet having direct connection with a keg, the object being to provide a device of this character that will keep the beer at a proper temperature, and, further, to so arrange the device as to supply ice water.

TAILOR'S MEASURE.—HESTER A. WOOLMAN and E. Z. LESH, Guadalajara, Jalisco, Mexico. In this patent the invention relates to tailors' measures such as used in marking garments before cutting. The object is the production of a measure having scales and marking-curves conveniently placed for the purpose of facilitating the measuring and marking operations. The device is preferably in the form of a plate the edges of which are formed with scales and curved in certain parts.

SEWER-PIPE.—G. FELTZ and W. S. EAST, Lima, Ohio. The invention relates to pipes, such as used in the construction of sewers and culverts. The object is to produce a pipe arranged so that the succeeding sections interlock with each other. Further objects are to prevent scouring under the pipe and to provide improved means for attaching the pipe to a bulkhead, such as found especially in culvert construction.

PROJECTING APPARATUS.—F. SCHWANHAUSSER, New York, N. Y. The inventor provides improvements in projecting apparatus, such as a combined dissolving stereopticon and a moving-picture apparatus, whereby only two lamps are required, one being capable of being bodily shifted in a lateral direction to assume an active position either for one of the stereopticon-lanterns or for the moving-picture apparatus.

METHOD OF MAKING CONCRETE SLABS OR BLOCKS AND APPARATUS THEREFOR.—W. R. STANTON, 2 Gonville Place, J. W. KNIGHTS, 67 Tenison road, and W. DRAKE, 4 Broad Street, Cambridge, England. The object in this invention is to facilitate the production of blocks and slabs by pressure or ramming in a mold; and to this end consists, essentially, in providing an improved form of vertical-sided collapsible core in conjunction with a separable mold for shaping the blocks and slabs, the core being so constructed that it may be withdrawn from the cavity of the block or slab without the necessity of the core being tapering in form.

CAP-FITTING.—W. C. TRUEX, Allentown, Pa. One purpose of this inventor is to provide a vase or cap-fitting for brass or iron bedsteads, newel-posts, and other devices where the above cap or vase may be used, which device is simple and economic in construction, capable of expeditious and convenient application, and when applied is entirely concealed from view.

EXCAVATING AND CONVEYING SYSTEM.—E. B. MERRY, Augusta, Ga. Mr. Merry's invention relates to systems for excavating various materials and transporting them to desired points in suitable receptacles. His principal object is to provide a simple and efficient system which will meet a wide range of requirements and be usable in many situations. By a slight rearrangement of the elements upon the frame the excavating-cable may be caused to operate at either side of tracks.

ELECTROCHEMICAL PROCESS OF PRODUCING NITROGEN COMPOUNDS.—J. W. WOOD, Moulton, Iowa. Mr. Wood's invention relates to an electrochemical process for producing nitrogen compounds. The process is conducted at ordinary temperatures. The electrolytic fluid around the anode is constantly drawn off by a siphon. The fluid is preferably renewed, by adding water thereto. The nitrogen which is constantly removed from the liquid is replenished by nitrogen of the air as said air passes in the form of bubbles upward through the liquid. A comparatively minute quantity of nitric acid may be used at the start, the air furnishing all of the nitrogen afterward needed.

PROCESS OF UTILIZING THE NUTRITIVE PROPERTIES OF MIDDLINGS.—S. B. APOSTOLOFF, 28 Bush Lane, Cannon Street, London, England. In this process the floury constituent of "middlings" (of whatever grade) may be extracted and utilized in breadmaking by introducing it into the kneading apparatus and therein incorporating it with the flour for the "batch." The process involves dissolving out the floury constituent from the middlings, adding yeast to the liquor and fermenting; straining the fermented liquor, so as to separate the bran or insoluble matter, and passing the strained liquor to the kneading trough for admixture with ordinary flour.

SAW.—S. J. GRAY and J. HORNING, Oakland, Cal. The arrangement of the joint while permitting sufficient flexibility in one direction will prevent bending of the links with respect to each other in opposite direction. By making the link substantially wedge-shaped in cross-section and placing teeth on the base of the wedge a strong link is secured with a smaller amount of metal than would be necessary with a link rectangular in cross-section. The wide edge of the link is adapted to withstand compression strain and afford a broad attachment for the teeth, while a narrow edge is sufficiently strong to resist a tension strain.

PERMUTATION-LOCK FOR BOTTLE-STOPPERS.—J. C. BOWERS, Boston, Mass. The lock comprises a casing carrying means for supporting the stopper, said casing having mounted therein a spring-controlled bolt, cooperating with which are a plurality of tumblers, which require to be brought into certain positions relatively to each other, by which to enable the lock and stopper to be removed. A dial-plate is employed for the lock, in association with which is a rotatable knob having special means for operating the tumblers to cause the bolt to become either engaged with or disengaged from a portion of the neck of the bottle.

PRINTING DEVICE.—O. D. SAFFORD, Passaic Park, N. J. While especially designed for printing columns, the device is particularly designed for printing names, addresses, and the like. The principal object of the invention is to provide for conveniently setting up words to be printed in such a way that they can be readily placed in alinement and readily removed from the printing device, so as to adapt it for those classes of business in which only a small number of impressions is required.

FIRE-ESCAPE.—J. A. REYNOLDS, New York, N. Y. This invention relates to a fire-escape or combined fire-escape and scuttle, the principal objects being to so construct a fire-escape in the shape of a ladder or stairway that it can be partially folded up out of the way and to connect it with a scuttle in such manner that the placing of the escape or stairway in a proper position will automatically open the scuttle, while the folding will close it.

TOBACCO-PIPE.—N. P. SHULIN, Butte, Mont. The object in this improvement is to provide a pipe arranged to keep fresh and clean, to prevent tainted saliva and nicotine from entering the smoker's mouth, and to prevent sparks leaving the pipe while smoking, thus rendering it perfectly safe to smoke the pipe at any desired place and without danger of setting fire to the surroundings.

SUBMARINE VESSEL.—S. NEVES, Valparaiso, Chile. One purpose here is to provide a vessel to contain one individual, who is supplied with atmospheric air from above the water level and have telegraph or telephone communication with attendants on the surface of the water, and to provide means for propelling the boat ahead, sternward, starboard, or port, or up or down, thus enabling descent to depths unattainable by ordinary apparatus, and whereby the person in the vessel having control can move in any direction, the bow being provided with bull's eyes, enabling the occupant to observe upon all sides of the vessel, as an electric light may be provided within.

ANIMAL-TRAP.—A. A. KELLOGG, Clinton, Mo. The invention refers to traps of the form commonly known as "cage-traps." It comprehends in its broad conception a trap having an adjustable tubular passageway leading from a suitable opening in the cage to its interior, means for adjusting the tubular passageway, a hinged door in the latter, and novel trigger and securing devices.

PROCESS OF HARDENING AND SOLIDIFYING OILS AND UNSATURATED ORGANIC COMPOUNDS.—A. KRONSTEIN, Karlsruhe, Baden, Germany. By this invention Mr. Kronstein is enabled to use any solidifying unsaturated organic compound similar to drying-oils other than wood-oil and in any proportions whatsoever, so as to obtain various grades of consistency from liquid to solid without use of a reducing agent and without fear of overstepping the desired degree of consistency and also to vary the time required for solidification. It is an improvement on this inventor's former patent.

FILTER.—A. L. JOHNS, Colorado Springs, Col. The structure is in the form of a barrel and is capable of being rolled for a sufficient time to cause ore therein to thoroughly mix, by which to facilitate and expedite chlorination of gold contained in the ore. The filter is of special construction, has means for securing the same in the bottom of the containing structure therefor, other means being employed between the filter and lining of said structure to prevent access of sand and the like to a chamber disposed beneath the filter for receiving from the latter the gold chlorid without admixture therewith of sand and slimes.

STORAGE-BIN.—G. H. WARREN and S. FONTAINE, Minneapolis, Minn. In this instance the invention relates to the construction of storage-bins, especially those used for the storage of grain and similar materials which must be kept free from moisture. The bin is provided with means for the circulation of air, and for reducing the possibility of a destruction of its contents by fire.

CASE FOR PHONOGRAPHIC OUTFITS.—M. HEMSTREET, JR., North Bergen, N. J. The object of this improvement is to provide means in which phonograph cylinders or records and the horn or trumpet may be conveniently packed and transported from place to place. This enables persons to carry the outfit conveniently and without danger of breaking the records. In attaining this end a case is provided having means for carrying a large number of records and also arranged to carry a telescoping trumpet or horn.

PAINT.—C. A. LUNDQUIST, Moscow, Idaho. This invention relates to paints used for coating various substances. It forms a hard coat of a character resembling that of cement, and it preserves wood or other surface from the action of rain or sunshine. It does not crack or peel off in the manner of paints of other kinds, and will stand for any length of time in any sort of weather.

CERAMIC PRODUCT.—M. M. MÉRAN, 155 Rue du Faubourg Poissonnière, Paris, France. The present invention has for its object a ceramic product constituted by magnesia silicates employed pure, but nevertheless presenting sufficient plasticity before firing and great strength when they have been fired. The first burning or the biscuit of this pottery may be provided with an appropriate coating or enamel.

GARMENT-CLASP.—J. H. GEISEL, New Rochelle, N. Y. Mr. Geisel's invention has reference to clasps for garments, it being especially applicable to the retaining in place of a belt, waist, and skirt. As its principal object it provides a compact and attractive device for this purpose which may be readily manipulated by the wearer and which will effectively perform its functions.

BUTTER-CUTTER.—G. ERICSON, New York, N. Y. The cutting edges are provided to be forced into the tub or mass of butter, thus forming a cake which is subsequently separated from the body of the butter by a cutting-wire or the like, the device being then withdrawn with the cake of butter thereon and being provided with an ejecting-plunger by means of which the cake may be delivered.

STAMP.—J. M. CAMPBELL, Lombard, Ill. The improvement refers to hand-operated stamps such as found upon desks in offices for the purpose of affixing dates or other printed matter to papers or envelops. The object is to provide a stamp with an inking device, to the end that the stamp or type may be inked quickly, neatly, and thoroughly, and so that a distinct and uniform impression will be produced.

VENTILATOR.—J. W. BE QUETTE, Platteville, Wis., and B. F. SACKETT, Toledo, Ohio. In this patent the invention relates to improvements in devices for giving ventilation to buildings or rooms, the object being the provision of a ventilator so constructed that the hot or foul air will readily pass out from the top or upper portion of a room and be replaced by fresh air. It is designed to be arranged in the wall of a building.

FOLDING UMBRELLA.—F. L. ATHERTON, Paterson, N. J. One purpose of the invention is to so construct the umbrella that the ribs can be permitted to remain at full length in opening and closing, operating at such time in practically the same manner as an ordinary umbrella, so that when it is closed the ribs will automatically fold outward upon themselves, reducing the body portion of the umbrella to about one-half of its length. It may easily be placed in a medium-sized hand-bag.

CIGAR-CASE.—M. NIELL, New York, N. Y. This improvement pertains to a cigar case or similar receptacle, the principal objects being to provide a combination lock and cigar cutter and to improve articles of this character. The construction provides a most convenient and effective locking and cigar-cutting operation without the use of a large number of movable elements.

LOCK FOR BAG-FRAMES.—L. B. PRAHAR, New York, N. Y. One purpose of the inventor is to provide a lock carried by one member of the frame, usually the central member, which will receive and fasten the other frame mem-

bers in closed position in such manner that either outer frame-member may be released without disturbing the locking connection between other frame members, and so that at will both of the outer frame members may be simultaneously released, completely opening the bag to which the frame is secured, both outer members when closed being self-locking.

Hardware.

LOCK.—G. FAIS, New York, N. Y. A combined bolt and hasp is employed having movement within a case, as well as through holes or openings formed in a door with which the lock may be associated, said case having a beam on the door, and being provided with a catch for engaging with the bolt and preventing the latter from being moved outwardly or withdrawn after proper manipulation thereof for effecting locking engagement with the hasp of one of the usual handles of a milk-can or the like.

NUT-LOCK.—I. J. GRIFFIN, Ossining, N. Y. In this case the object is to provide a new and improved nut-lock arranged to allow convenient screwing up of the nut on the bolt to the desired position, to securely hold the nut against accidental return movement, and to permit the operator to unlock the nut for unscrewing the same whenever it is desired to do so.

Heating and Lighting.

CHIMNEY-COWL.—C. T. MILLER and D. B. STORCK, Battle Creek, Iowa. The cowl is formed from a single piece of metal, and the same is of special construction by which wind striking it from any direction is caused to be utilized as an accessory in educting the smoke and other products of combustion from the chimney in connection with which the cowl may be employed. The structure may also be formed of two pieces of metal, each practically a duplicate of the other, the two pieces being cut out and struck up to the desired form, so as to present substantially the form of the first piece of metal.

ILLUMINATING APPARATUS DESIGNED FOR USE IN FLASH-SIGNALING.—A. ROSENBERG, 259 High Holborn, London, England. The object in this case is to provide self-contained apparatus capable of being packed away in a small compass when not in use and wherein, as compared with other similar apparatus, first, a larger proportion of the light may be utilized; second, the projected beam of light will have a relatively greater range of transmission or penetrative power coupled with diminished liability of signals being read by persons for whom they are not intended. The invention relates to apparatus for optical signaling, but applicable also as search-light apparatus.

INCANDESCENT GAS-LAMP.—L. T. ALTON, New York, N. Y. The invention provides a check and air-mixing chamber and also an additional air-chamber which surrounds the mixing-chamber and permits a supply of pure air—that is, air free from gas—to be directed against the inside of the mantle in predetermined quantities, whereby a more complete combustion is had, and a larger mantle may be heated either to incandescence, if the mantle is to be used for lighting purposes, or to a lower degree if the burner is desired for heating purposes only.

TIME GAS LIGHTING AND EXTINGUISHING APPARATUS.—T. F. WESTENHOLZ, Hellerup, Denmark. This device comprises an hour-dial, a lifting-hand movable over the dial, an extinguishing-hand movable over the dial, a spindle on which both hands are mounted, a pinion, a releasing-lever for engaging the pinion, a lever having a blade-shaped stop, a pin, a wheel on which the pin is mounted, arms, and devices in which said arms are designed to engage to stop the motion of the lighting and extinguishing mechanism. It is to be employed in street-lamps and houses especially.

Household Utilities.

STOVE.—F. A. BUCK, Hubbardston, Mich. In operation the damper is lowered to close communication between the rear flue and the smoke-vent while the fire is kindling, making direct draft from the fire pot through the smoke-consuming chamber into the vent. Well kindled, the direct draft may be shut off by raising damper to close communication between upper part of stove and vent, thus forcing heated gases down through the front flue, the base-flue, and up through the rear flue. Draft in either direction may be regulated by check-drafts. Magazine lightly covered, all draft must be through the opening between the baffle-plate and the front lining-section.

MOP-WRINGER.—R. CHRISTENSEN, Ogden, Utah. The intention in this improvement is to provide a wringer which forms a permanent fixture of a pail or like receptacle and is arranged to permit of conveniently placing a mop in the wringer to wring out the mop and to cause the dirty water to pass into the pail without splashing the water upon the floor during the wringing operation.

WATER-CLOSET BOWL.—A. W. HOWE, Honolulu, Hawaii. In the present patent the invention has reference to water-closet bowls; and the object is the production of a bowl with which a cuspidor is incorporated, to the end that the cuspidor may be automatically cleaned. The device is very sanitary.

DETACHABLE SUPPORT FOR IMPLEMENTS AND OTHER ARTICLES ON STOVES.—F. B. SMALL and J. C. MULLIGAN, Bath, Me. The object of the improvement is to provide a device and means for detachably clamping it upon the border-flange of a top plate on a stove or range, and affording very convenient means for holding implements used at a stove for ready removal. It provides means for supporting plates or other dishes, adjacent to or over the stove to warm them, and a support for towels to or above the stove to dry them.

EGG CUP AND CUTTER.—E. N. GAILLARD, New York, N. Y. The cup and cutter is arranged to prevent soiling of the hands or tablecloth by securely and neatly holding a boiled egg in position to allow of conveniently cutting off the top portion of the egg by the use of knives in a hinged cover, retaining the cut-off portion within the cover when swinging the latter over to allow free access to the opened-up egg and readily receiving any drippings from the egg.

POTATO-MASHER.—C. C. NAEVE, Portland, Ore. The material to be pulped is introduced through the hopper into the feed-chamber. The crank being revolved this material is forced by the screw, with the assistance of the ribs, longitudinally of the chamber and against a perforated plate, through the openings in which it passes into the mixing-chamber, thus receiving its preliminary division. Here it is subjected to the action of heating-fingers, which reduces it to a creamy state. Milk or other fluid, and condiments, may be delivered from the reservoir into the pulp and mingled therewith, the mixture being finally discharged over a chute. Means are provided for readily cleaning the apparatus.

Machines and Mechanical Devices.

TYPE-WRITER.—A. H. HOGEN, Geddes, S. D. An important object in this invention is to do away with the keyboard now ordinarily used and the delicate connections with which it is usually provided. The invention comprises means for accomplishing all of the results obtainable on high-priced machines of a complicated nature, these being obtained by means which render it possible to build a machine that will have very few delicate and easily broken or deranged parts and at the same time will be capable of being built at a low cost.

DEVICE FOR PAINTING OVERHEAD WIRES.—G. WELMAN, New Orleans, La. By this device overhead wires, especially insulated feed-wires, may be given a coating to preserve them from the elements of the weather. It is designed to be operated from the ground and to apply a coating of paint or other preservative in an effective, rapid, and economical manner. It is so constructed that the paint can be automatically applied and evenly coated by cheap labor and without danger to life or limb in its application.

ATTACHMENT FOR PLANERS.—J. H. BAUER, New York, N. Y. The invention pertains to an attachment for planers and similar machine-tools adapted for modifying the ordinary operations performed by such tools. The principal ways Mr. Bauer modifies the operations are to turn the work so as to provide for cutting a screw-thread on it and to move it on the support upon which it is mounted in such a manner that the stationary tool past which it moves will make a cut having a curved or slanting inner surface. The device will cut a molding of any kind in a column.

VARIABLE-SPEED DRIVING MECHANISM.—R. M. RUCK, 44 Thurloe Square, South Kensington, London, England. The principal object of the present invention is to provide means for enabling the pinion member of the mechanism to be shifted lengthwise of the cone by hand under automatically-acting control instead of by automatically-actuated mechanism under manual control. The invention relates to that type of variable-speed driving mechanism which is described in an application for Letters Patent having Serial No. 310,696.

MECHANICAL MOVEMENT.—W. F. MURPHY, Long Branch, N. J. The invention consists in the combination of a driving-shaft connected to a driven shaft through a driving-disk with intersecting guide-grooves in its face traversed by guide-blocks, a cross-head connecting the blocks and a crank-shaft on the driven shaft at one end and to a counter-shaft geared to the driven shaft by cranks and a link at its opposite end. This movement will be found desirable in boats and locomotives.

TRANSMISSION GEAR.—W. L. BUCK, New York, N. Y. The invention relates to mechanism for transmitting rotary motion at different speeds and in opposite directions. It is applicable to various uses, notably in automobile transmission and for transmitting from gasoline motors in marine propulsion. Change of speed and direction is accomplished by the relative movement of gears, which are meshed the periphery of one gear against the face of the other.

COMBINATION-GAGE.—J. D. CANN, New Castle, Pa. The purpose of the invention is to provide a combination-tool or universal machinist's tool whereby the gage, bevel, or angle of any piece of work may be quickly and accurately determined; and the purpose is to construct such a tool of three main elements capable of use independently or in combination.

MACHINE FOR RESHAPING BOTTLE-CAPS.—G. G. GLENN, Gastonia, N. C. In the present patent the object of the invention is the provision of a simple and practical machine for reshaping previously-used crown-caps for bottles and at the same time inserting new cork disks therein. The inventor has found that the bottle-caps may be used as a rule four times to advantage.

WIRE-FENCE MACHINE.—H. J. GARDNER, Montpelier, Ohio. With a single revolution of a crank the stay-wire is given two complete wraps, or more if desired. The second coil passes over the first, providing a lock. Means are provided for folding the machine into small compass, easily transportable. A double cutter saves much time in severing the wire, which is ordinarily done by hand with nippers. A stronger fence results from wrapping the stay-wires in opposite directions than when wrapped in the same direction, since in the first case they serve as braces for each other and not so easily displaced.

BRICK-MACHINE.—C. E. POSTON, Crawfordsville, Ind. Mr. Poston's object is to provide means for giving to the bricks unique and novel faces and ends as distinguished from known smooth or glazed faces. Rough-surfacing is desirable for a variety of reasons, among which are more ornamental appearance and a better bond when laid. This invention provides means for producing it without hand-labor and the use of "brooms" or other devices.

EXERCISING DEVICE.—F. PÉLISSIER, Gonaives, Haiti, W. I. The device is intended especially to be used by musicians for the purpose of manipulating the knuckles so as to increase their flexibility. The object of the invention is to produce a device which will afford means for giving the fingers of the hand a movement at the joint and to provide such arrangement as will enable various relations between the movements to be produced. It may be used by paralytics, or persons whose hands are attacked by numbness or stiffness at the joints.

CENTRIFUGAL FILTER.—R. E. LEE, Franklin, La. In the present patent the invention has reference to centrifugals or centrifugal filters, and the object of the improvement is the provision of a cylinder or drum of such construction as will enable the same to be readily adapted to machines of slightly-different sizes. The cylinder is of very simple construction.

FABRIC-HOLDING FRAME.—H. HOCHREUTENER, West Hoboken, N. J. One purpose of the inventor is to provide a frame adapted for use in connection with what is known as "Swiss embroidering-machines" and to so construct the frame that any desired number of retaining devices may be employed, which devices are simple, light, and strong, and so that by their means any desired number of pieces of fabric may be quickly and conveniently stretched and firmly secured in their stretched position without danger of injury to the goods.

METHOD OF LUBRICATING PNEUMATIC MACHINERY.—E. A. EMERY, Cripple Creek, Col. The inventor employs a lubricant of a solid nature and utilizes a current of compressed air as the vehicle by which the lubricant is carried to surfaces desired to lubricate. The most potent factor in dissolving a charge of solid or pressed lubricant is the action of moisture present in the current of compressed air on the charge, and he places the lubricant charge in such proximity to the path of the current that the moisture therein will have access to the lubricant so as to dissolve the latter gradually and slowly. The lubricating solution thus formed is conveyed in the air-current to surfaces of the machinery.

LUBRICATOR FOR PNEUMATIC MACHINERY.—E. A. EMERY, Cripple Creek, Col. In the present invention Mr. Emery employs a construction adapted to contain a "cartridge" or charge of solidified oil or grease treated to make it soluble when attacked by moisture, and around or adjacent to this cartridge the motive fluid is caused to circulate, so that the cartridge is caused to dissolve by its affinity for the moisture in the motive fluid, whereby the lubricant is taken up by the current of the motive fluid and carried into the machine or parts it is desired to lubricate.

WRITING-MACHINE.—J. B. VIDAL, Havana, Cuba. Mr. Vidal's invention has reference to a writing-machine, and the object of the improvement is to construct a writing-machine which will be capable of attaining a speed equal to that of an expert stenographer. Two sets of keys are used and when operated there is no danger of a finger touching the wrong key, and mistakes are thereby avoided.

FLOAT MECHANISM.—P. S. MAURITZEN, Port Richmond, N. Y. In this case the invention relates to float mechanism adapted for use in connection with intermittent flushing apparatus and with pumps or siphons for periodically emptying catch or drainage basins. Its principal objects are the provision of a simple and effective mechanism of this character.

Prime Movers and Their Accessories.

STEAM PUMPING DEVICE.—E. C. POLLARD, Seattle, Wash. The entire apparatus may be built of standard pipe-fittings, except nozzle and inclosing screen. As an engine it is believed that this apparatus comes as near to fulfilling Carnot's law of the perfect heat-engine as any devised. Downward pressure of the column of water being lifted, which is due to the action of the vacuum, it is not to be considered as a loss of energy, because it is balanced by the upward flow of the water through the suction-pipe, which is due to the same cause.

VALVE-GEAR.—W. HARTMANN, 64 Augsburgerstrasse, Berlin, Germany. The invention relates to valve-gears for use on steam-engines, gas-engines, and other motors. The present invention enables Mr. Hartmann to dispense with the rocking arm actuating the valve-lever by using a detent mechanism which alternately connects the valve-lever with the driving mechanism and locks the valve-lever during the period in which the valve is closed.

CARBURETER.—O. H. HINDS, Le Mars, Iowa. The invention is an improvement in gas-machines or carbureters wherein atmospheric air is utilized to take up the vapors of hydrocarbon liquids—such, for instance, as gasoline; and the invention has for an object the provision of means whereby the amount of gasoline taken up in the air to enrich the gas may be varied without varying the volume or pressure of the air.

ROTARY EXPLOSIVE-MOTOR.—S. DENTON and E. S. VEEN, Great Falls, Mont. A circular cylinder is connected with a rim by means of radial pockets, the whole constituting a fly-wheel, and the pockets carrying radially-movable abutments which co-act with a stationary piston carried by a stationary shaft, on which the cylinder is mounted to turn, and the shaft and piston provided with ports for the inlet and exhaust of the motor fluid.

VAPORIZER FOR HYDROCARBON-ENGINES.—C. F. PEARSON, Chicago, Ill. The special object of the present invention is to provide means for effectively regulating the vaporizer so as to increase and diminish the supply of fuel, this regulation taking place without, however, affecting the uniformity of the fuel mixture supplied to the engine. It constitutes an improvement in the type of vaporizer disclosed in a prior patent granted to Mr. Pearson.

Railways and Their Accessories.

SWITCH-OPERATED SIGNAL-LIGHT.—G. W. JORDAN, Purvis, Miss. When the switch is closed the electric lamp will flash, thus notifying the engineer that the switch is in proper shape. When, however, the switch is open, there will be no flash, thus giving warning that all is not right at the switch. By arranging the lamp to operate when the switch is closed liability of error from defects in the apparatus is eliminated, since it is apparent that failure of the signal to operate for any reason, will indicate "danger" to the engineer.

DERAILER.—T. W. LINN and J. H. PATRICK, Clymers, Ind. This device is for use in derailing railway rolling-stock. It may be used on sidings to prevent cars on the siding from accidentally entering the main track or at a railway-crossing to prevent cars from running onto the crossing when the signal is set against them. A feature is the provision of a shield for protecting the device from snow or rain and from dirt, also the provision of means on the derailer for cutting through and clearing away any ice, snow, or dirt which may have accumulated between the rail and the derailer.

CAR-COUPLING.—P. D. SERRURIER, Savanna, Ill. The purpose here is to overcome the delays to trains caused by the breaking of the draft devices. Generally the part which breaks is the lug holding and forming a pivotal support for the knuckle. The coupling is so constructed that when the lug is broken it may be removed and a new one applied without disturbing the draw-head proper. To this end the coupling is made in two sections, one the "draw-bar" the other the "removable draft-section," the latter being so fitted to the draw bar that it can be removed therefrom when it is desired to replace it with another.

EMBEDDING FOR STREET-CAR RAILS.—F. MELAUN, 9 Hardenbergstrasse, Charlottenburg, near Berlin, Germany. A pavement constructed according to the process in this invention can be submitted to driving as soon as finished. In case work has to be done on the rails later on, the asphaltum cover is first removed on the particular places and the inserted stones are then taken out one by one. The taking or lifting out is effected by lifting devices, and for this purpose the stones are provided in course of construction with iron rings.

RAILWAY-RAIL.—C. W. LANDERS, Genoa, Neb. The object of the improvement is to produce a rail of great strength and durability and which will be reversible in character, so that either face of the rail may be used as the tread or head. This railway-rail is very rigid and its capability of reversal when worn increases the life of the rail.

CAR-DOOR LOCK.—B. B. ROSS, Albany, N. Y. The intention is to use this improvement for locking the doors of milk-cars and while it is especially applicable in this connection, it may be applied to doors of other constructions. The object is to produce a lock of simple construction which is always held in a fixed position, so that it cannot swing against the wooden parts of the door-frame or door to cause damage.

RAIL-JOINT.—E. P. WINGREN, Denison,

Tex. The object here is to provide a joint arranged to securely unite the meeting ends of adjacent rails with each other to allow expansion and contraction of the rails without their sliding on the joint, thus preventing wear, to insure lateral alinement of the rails, to effectively resist the flange thrust on curves, and to allow the convenient use of the device on steam and electric railways.

Pertaining to Recreation.

SKATE.—T. Spacie, Houston, Texas. Mr. Spacie preferably provides the skate with a foot-plate, but embodies in connection therewith substantially similar devices for attaching the skate to the sole and heel of a shoe, as described in former Letters Patent granted to him. Special means are used for securing to the under side of the foot-plate the forward set of rollers for the skate, and other special means are employed for also attaching to the under side of the foot-plate the rearward sets of rollers employed for the skate.

PUNCHING-BAG. — C. McKenzie, Butte, Mont. The invention is an improvement in bags, such as are used for practice in boxing and exercising. The apparatus embodying the invention includes two bags which are so suspended and adapted to revolve and swing laterally in vertical planes as to afford special advantages for instruction in boxing and exercise in general.

CONFETTI - CANNON. — R. Kliemandt, Mount Vernon, N. Y. The device is for use upon social occasions and for amusement for the purpose of scattering the substance known as "confetti" over floors and tables and over the persons of participants in various social functions. The invention relates more particularly to a miniature cannon or mortar for causing the confetti or analogous substance to be scattered by means of an explosion.

CARRIER FOR GAME.—J. M. Paul, El Paso, Texas. One purpose of the inventor is to provide a device for carrying game adapted to be worn across the shoulders and held in place by the weight of the load. Another, is to so construct the device that moderately large or small game of all kinds in large or small quantities may be expeditiously, conveniently, and securely placed in position in the carrier and carried with comfort without injury to the game.

Designs.

DESIGN FOR A BOTTLE. — G. Buton, Bologna, Italy. In this original and ornamental bottle the inventor produces a design the length of which is about evenly divided between the neck and body portion. The latter is plain in outline, but the neck at its center is gracefully and slightly increased in diameter.

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Inquiry No. 8293.—For manufacturers of machinery for cutting and polishing the bevel on plate glass.

Inquiry No. 8294.—For manufacturers of match-making machinery.

Inquiry No. 8295.—For manufacturers of machinery for sawing logs up into shingle lengths by having it stationed on the log and operated by a small gasoline motor.

Inquiry No. 8296.—Wanted, a decorticating machine for South American fibers.

Inquiry No. 8297.—Wanted, a malleable cast factory to manufacture a horse release evener.

Inquiry No. 8298.—For manufacturers of wood-turning machinery, such as machines for making bungs for beer barrels, also wooden corks, also spigots.

HINTS TO CORRESPONDENTS.

Names and Address must accompany all letters or no attention will be paid thereto. This is for our information and not for publication.

References to former articles or answers should give date of paper and page or number of question.

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(10085) C. S. J. asks: I wish to learn the cause of trichinæ in pork. A. The trichina spiralis is a worm, a parasite of the hog. It is often found in great numbers in the flesh of these animals, in the encysted condition but still alive. If such meat is eaten without cooking thoroughly, the parasite is taken into the body and is rapidly propagated. The worm came originally from the rat. As hogs eat rats, they pass into the hog and thence into man. The only preventive is thorough cooking. This kills the trichinæ. No rare or underdone pork should ever be eaten. The risk is too great. The cost of immunity is so little, that anyone may be safe. Cook all pork thoroughly. 2. The cause of ptomaine poisoning by eating pork. What causes the presence of the poison, how the poison can be prevented, and whether or not there is any way of detecting the presence of poison before using the meat? A. Ptomaines are formed by decomposition. If only fresh food is used, one will be safe from these poisons.

(10086) H. S. N. asks: I have been a reader of your paper for several years, and always enjoy reading it. I should like to submit a problem for solution. The problem is this: Several years ago I took a picture of a fast train while running, a Michigan Central flier, at a point about two miles east of Decatur. On development the plate showed a blur of 1-32 inch, i.e., the pilot did. I used a Vive extra rapid plate; the focus of the lens was 6 inches; the distance of the engine, the pilot, from the camera, 50 feet; the length of exposure, 1-100 of one second; camera was placed at an angle of 15 deg. with the track. What was the speed of the train? The camera was a Vive, 4¼x4¼, meniscus lens. A. The solution of your problem of the speed of the train is not difficult, at least so far as a sufficiently close approximation is concerned. Start with the fact that the image of the pilot moved 1-32 inch during exposure. Since the lens is 6-inch focus and the pilot is 50 feet away, the pilot moved across the line drawn through the center of the lens, 100 times 1-32 inch, or 3.125 inches, since 50 feet is 100 times 6 inches. And since the camera made an angle of 15 deg. with the track, we must divide the 3.125 inches by the sine of 15 deg. to find the distance the pilot moved during the exposure. This gives 12.07 inches as the distance the train moved in the time of exposure, or 1-100 second. In one second it moved 1,207 inches, or 100 feet 7 inches. This is a speed of somewhat over 71 miles per hour. As we said above, this is an approximate solution, but still not far from the result which an exact solution would give.

(10087) J. S. M. asks: Will you kindly answer in your column of Notes and Queries the inclosed questions relative to Roman computation? I suppose the matter is simple enough, but I have never come across any work explaining it, nor any person whom I have asked who could throw any light on the subject. A. Very little is known concerning the method by which the Romans used their very inconvenient notation for performing the ordinary calculations. They are supposed to have used the abacus for all except the most simple problems. This instrument is in common use now by all Chinamen, and it is not difficult for any one to see it used wherever these men may be found. A description of the abacus may be had from any encyclopedia. There was a rod for each denomination of numbers to millions, seven rods each carrying five balls. Another set of short rods corresponded to these, and had one ball sliding on each. They could thus count by fives and carry by tens. Other rods supplied their need for calculating ounces. Further than this their business did not require them to go; they never needed to divide the distance of the sun by the velocity of light. They died in total darkness in regard to both of these data of the universe. As we said at the outset, we do not know the detail of the method by which the Romans made their calculations. Their mode of writing numbers was not like ours by placing like denominations in the same column, but each letter had its significance, and each number could be added by itself on the abacus, since each rod meant a denomination.

(10088) A. N. says: 1. I have seen it stated frequently that a single "ground" on a metallic circuit, while a source of danger, does not impair the transmission. If the potential at a "ground" is 5,000 volts, for instance, does this not mean 5,000 volts above the zero potential of the earth? If so, why does not all the current, if the resistance at the "ground" is low, flow to earth and equalize? A. A single ground on a metallic circuit does not impair the transmission as you state. The amount of electrification that passes to the earth is so small, and the capacity of the earth is so great, that it would take practically an infinite period of time to change its potential. 2. Standing on the ground, can a person touch with impunity one wire of a high-potential circuit if the circuit is free from "grounds"? A. If there was no ground, and no chance for the current to jump and produce another ground, there would be no injury to you in touching a high-potential circuit, but such a condition practically never exists on outside circuits. 3. About what is the resistance in ohms of the human body? A. This varies with the person, the points where contacts are made, and the condition of the flesh where these are made, but it is approximately 2,000 ohms. 4. What is the minimum strength of current the human body can endure? A. You probably mean the maximum. This also varies with the person, and the condition of the body, from 0.5 to 1 ampere.

(10089) F. J. M. says: Will you please answer the following questions through Queries column of your paper: 1. What is a Faradic brush? Please give a short description of it. A. We believe you refer to the brush made of wire bristles, which are connected to one terminal of the coil, while the other terminal is connected to a plate on which the hand rests, thus sending the current from the coil to the brush, the head, and back to the coil through the hand. 2. Does it make any difference what kind of cells are used in connection with a physician's coil? A. Any kind of battery can be used. A good form of dry battery is the most convenient. Always give full name and address, as we might wish to answer your query by mail.

(10090) F. G. says: Please print formula for making a vibrator jump-spark coil for a 3-horse-power engine. A. Scientific American Supplement, No. 1402, price ten cents, gives full directions for winding induction coils of various sizes. One giving a spark 1 inch long would be large enough for your purpose.

(10091) J. B. A. says: Is there any cheap way one can fix a camera so as to make a picture direct on bromide paper, so that you will not have to make a negative, then a print? I thought that there might be an arrangement attached to the lens, so as to change the image on the ground glass, so that when you develop the negative it will appear like a positive. If an arrangement of this kind can be made, will it decrease the light coming through the lens, and how much? A. There is no arrangement by which you can obtain a positive by exposing the bromide to the object through a lens. The negative differs from the positive in other respects than in the inversion of the image. The tintype process appears to do this, but if you look at it carefully you will find that the positive is a perverted image of the object. We fail to see any advantage in such an arrangement, as duplicate copies could not be obtained. If you increase the number of lenses through which the light passes, the image will not be as bright.

(10092) W. D. W. says: Will you be kind enough to answer the following questions for one who is anxious to know and who has the greatest respect for your opinion on scientific matters? 1. Will electric wires, furnishing current for arc lights coming in contact with street trees, injure them, that is, when the insulating covering has worn off from rubbing against the branches of the tree? One of the tree and park commission of this city (Columbia, S. C.), a college professor and a very intelligent gentleman, insists that the electricity, that is, all that is taken by the tree in wet weather, will do no harm, while I hold to the opinion that it will ultimately kill it, and I wish to know which one of us is wrong. A. We have found by experience that leakage from electric arc light wires does injure the limbs of trees, particularly when the difference of potential is very great, although we do not believe it would kill the tree unless it was very young. 2. When a tree has been killed by escaping electricity, how long a time should elapse, in case the leak be located and stopped, before it will be safe to put another tree in its place? A. We see no reason why another tree cannot be put in at once if the ground has been removed. 3. Some very large oaks that are exposed to the smoke from the railroad workshops have died very recently, and I am anxious to know if the smoke is responsible for their dying. The shops have been there for a long time, and it seems that if the smoke is the sole cause the trees ought to have died long before this time. It may be possible, however, that loss of vitality on account of age may be partly responsible for their dying. A. If the trees are very close to the top of the smoke-stacks, we have no doubt that the trees have lost some vitality on account of it, as the products of combustion are very destructive to vegetable life, but the trees would have to be under the direct influence of the smoke.

NEW BOOKS, ETC.

Lloyd's Register of American Yachts. 1906. By the Committee of Lloyd's Register. New York: Lloyd's Register of Shipping, 15 Whitehall Street. 384 pages. 35 colored illustrations of flags of the United States and Canada. Price, $7.50.

It was as long ago as 1874 that a small but complete volume containing the register of yachts was issued in New York. Since that time, publications of a like character have been local, rather than national, in scope, confining themselves to the larger yachts and clubs of the Atlantic seaboard only. In 1877 the Committee of Lloyd's Register of British and Foreign Shipping was requested by British yachtsmen to classify yachts after the same plan as merchant vessels. The work thus begun continued to the present time. In 1902, in response to a demand from American yachtsmen, the committee issued a similar Register of American Yachts, which has been continued annually to the present date. In the present volume for 1906, an entirely new plan has been adopted in the arrangement of the work. The introduction of other types of motor than the steam engine has removed the necessity for dividing yachts into two divisions, steam and sail. Consequently, all yachts in the present volume are grouped in one alphabetical list. The almost universal use of the internal-combustion engine has called for a more complete description of this type, and the diversity in hulls has called for new particulars descriptive of the details of houses and cabins. In quality of paper, type, and illustrations, this excellent work is fully up to those which have annually preceded it. The first 260 pages consist of the register, which gives the full particulars concerning the construction, rig, leading dimensions, designer, builder, and place and date of launch, the machinery, the owner's name, and the home board of registry. Particularly handsome are the thirty-four colored plates, giving the flags of yacht clubs and the flags of private owners, following which are the particulars of the American and Canadian yacht clubs, lists of yacht designers, engineers, builders, etc., also an alphabetical list of yacht owners.

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Pulley block, J. M. Boyd 827,680
Pulley, sash, F. S. Clarkson 827,618
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Rail joint bridge plate, F. E. Abbott, reissue 12,518
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Revoluble members, mechanism for intermittently rotating and stopping, Pearson & Roberts 827,662
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Roasting furnace, H. W. Fox 827,226
Roasting furnace, F. E. Marcy 827,547
Roll, journal bearing, and the like, E. J. Francis 827,689
Rolls on their axles, clamp for fastening stone couch rolls and wet press, G. Renker 827,394
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Rotary engine, W. E. Weber 827,276
Rotary engine, L. A. Hicks 827,529
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Sawmill feed, G. S. Sergeant 827,572
Scaffolding to iron joists, contrivance for the fastening of flying, W. Stieper 827,268
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Shade roller raising, lowering, and supporting device, W. N. Dunn 827,688
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Signal for steam railway and electric railway purposes, fog, C. G. Ritchey 827,566
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Testing instrument, F. H. Schauffler 827,397
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Washing machine dasher or stirrer head, W. H. Voss 827,336
Watch balance staff protector, J. R. G. Addington 827,137
Water, apparatus for purifying, Sheuerman & Hand 827,399
Water, apparatus for purifying and softening, Sheuerman & Hand 827,400
Water heater temperature regulator, steam, J. D. Bowne 827,608
Water level, device for indicating at a distance the height of a, F. Rittmeyer 827,182
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Windmill, W. P. Brett 827,611
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Window fastener, screen and storm, J. W. Councilor 827,083
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Wire drawing machine, J. A. Horton 827,371
Wire fence machines, steering and brake mechanism for, C. F. Leonard 827,695
Wire reel, A. Asper 827,598
Wire splicing tool, W. H. McCloud 827,552
Wire stretcher, W. H. Culp 827,085
Worsted balling machine, automatic, G. J. Torrance 827,332
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Wrench, W. I. Measer 827,250
Wrench, H. B. Shaver 827,672
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Boots and shoes, leather, H. W. Crooker Shoe Co. 54,824
Boots and shoes, leather, Shoemart Company 54,837
Bottle nipples, nursing, Davidson Rubber Co. 54,808
Cabinet for medicine, portable, Home Physician Co. 54,847
Calendars and show cards, fancy, International Art Publishing Co. 54,848
Canned, bottled, and preserved fruits and vegetables, L. De Groff & Son 54,891
Canned salmon, Bandon Packing Co. 54,888
Canopies, bed, Southern Canopy Co.. 54,797, 54,798
Cards, playing, United States Playing Card Co. 54,800, 54,801
Catsup, tomato, Wm. Henning Co. 54,908
Cement, Portland, I. C. Johnson & Co. 54,785
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Checks or slips and checkers' sheets, Hotel Security Checking Co. 54,829
Chimneys, lantern globes, and reflectors, glass, Gill Brothers Co. 54,845
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Cigarettes and tobacco for cigarettes, Nestor Gianaclis Co. 54,790, 54,791
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Cloths and stuffs of wool, worsted, or hair, Edward Ripley & Son 54,823
Coats, vests, and pantaloons, boys', Greenstein, Simon & Leerburger 54,900
Coffee, Browning & Baines 54,889
Coffee, G. B. Farrington Company..54,895 to 54,899
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Cooking vessels, earthenware, J. W. McCoy Pottery Co. 54,850
Cords, blades, tapes, and fabrics, stiffening, Warren Featherbone Co. 54,905, 54,906
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Fruits or vegetables, hermetically sealed, Aughinbaugh Canning Company 54,864
Grates, fireplace, Aldine Grate & Mantel Co. 54,859
Gum shellac, Alden & Co., Geo. A. 54,768
Hat pins, combs, and hair pins, gold, Krementz & Co. 54,831
Hosiery, Des Moines Hosiery Mills 54,809
Hosiery, Weeks and Ascher 54,884
Jars, fruit, Hazel-Atlas Glass Company 54,846
Journals, trade, Ware Bros. Company, 54,839 to 54,842
Knit undershirts and drawers, Cooper Underwear Co. 54,890
Knitted underwear, G. W. Schlichten 54,904
Knives and razors, pocket, Northfield Knife Company 54,877
Knives, carving, Landers, Frary and Clark .. 54,875
Lamp glasses and globes, Macbeth-Evans Glass Co. 54,834
Leather, harness, Haffner Bros. 54,825
Leather polish, Whittemore Brothers & Co. 54,803
Linings, Eddystone Manufacturing Company 54,819
Linoleums, P. O. Judson & Co. 54,902
Magazine or periodical, monthly, J. Shepherd Clark Company 54,849
Matches, safety, Jonkopings och Vulcans Tandsticksfabriksaktiebolaget 54,851
Meats, smoked and pickled, F. A. Ferris & Co. 54,894
Mustard, Wm. Henning Co. 54,909
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Newspapers, Manufacturers' Record Publishing Co. 54,853
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Olives, Wm. Henning Co. 54,910
Paint, mixed, Chas. R. Long Jr. Co. 54,807
Paints, damp resisting, Toch Brothers 54,799
Paper board, parchmentized, Leatheroid Manufacturing Company 54,832
Paste, flour, E. Hoffmann 54,784
Patent leather, calfskins, and waxed calfskins, C. Heyl 54,827
Pencils, lead, Eagle Pencil Company 54,810
Pens, certain named, Thomas De La Rue and Co. 54,832
Pens, fountain, S. L. Kiser & Co. 54,830
Pickles, certain named, Wm. Henning Co.. 54,907
Picks, mattocks, grub hoes, and eye hoes, Simmons Hardware Co. 54,880
Playing cards, New York Consolidated Card Co. 54,836
Powder, washing, Ruschhaupt Bros. 54,795
Publications, serial, Railway Equipment & Publication Co. 54,855, 54,856
Relishes, Wm. Henning Co. 54,885
Rubber boots, shoes, and overshoes, M. D. Wells Co. 54,833
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Saws, circular, band, hand, and crosscut, Joshua Oldham and Sons 54,874
Seesaws, roundabouts, and teeters, E. D. Smith 54,796
Sheet metal, dovetailed corrugated, Brown Hoisting Machinery Co. 54,866
Shoe polish, American Chemical Manufacturing & Mining Co. 54,769
Show cases, Sun Manufacturing Co. 54,857
Silk piece goods, Aitken, Son & Co. 54,805
Snap fasteners for skirts, sew on, Scovill Manufacturing Co. 54,879
Soap, Cresenola Soap Co. 54,775
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Soap, toilet, Iowa Soap Company 54,786
Soap, toilet, J. G. Mouson & Co. 54,789
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Soluble oil and grease, Arabol Mfg. Co. 54,806
Spices, A. G. Groblewski 54,901
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Tobacco, smoking, Butler-Butler 54,774
Trousers, Dutchess Manufacturing Co. 54,893
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Violins, violoncellos, violas, and parts of such instruments, M. B. Hern 54,854
Washing machines, bottle, M. C. Rosenfeld Co. 54,876
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"D-Lish-Us Gum," for chewing gum, American Vending Machine Co. 13,027
"Daisy," for canned lobster, J. A. Neville. 13,022
"Dr. Le Brose Anti Dyspepsia Tablets," for medicine for the treatment of dyspepsia, New York Remedy Co. 13,029
"Espenella," for cigars, R. & A. Abrams.. 13,019
"Hawaiian Pineapple (Long Wafers)," for pineapples, Tropic Fruit Co. 13,024
"Hawaiian Pineapple (Round Wafers)," for pineapples, Tropic Fruit Co. 13,025
"Hershey's Milk Chocolate Wafers," for chocolate candy, P. R. Warren Co. 13,026
"Mac Riek Whiskey," for whiskey, McLaughlin & Riekenberg 13,018
"Man-a-lin the Ideal Laxative," for liquid purgative compounds, Manalin Co. 13,028
"Milk-Amon-Oat," for a toilet washing powder, J. Sherin 13,031
"Prize Medal," for evaporated apples, Young & Beach 13,023
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Powders and remedy for children's diseases, teething and cooling, J. A. W. Bouvier	54,964
Powders, teething and cooling, J. A. W. Bouvier	54,963
Preparations for the cure of certain named diseases, E. E. Sutherland Medicine Co.	54,991

Rasps, Stokes Bros. Manufacturing Co.	55,123
Razor strops and hones, Hibbard, Spencer, Bartlett & Co.	55,074
Razors, U. J. Ulery	55,165
Razors, knives, and forks, T. R. Cadman & Sons	55,078
Remedies for diseases of the throat and lungs, National Remedy Co.	54,980
Remedy for certain named diseases, Krupp Remedy Co.	54,976
Remedy for certain named diseases, Mueller Chemical Co.	54,979
Remedy for certain named diseases, S. A. Albertus	54,989
Remedy for leprosy and diseases of the blood. A. F. Toro	54,996
Remedy for the treatment of the feet, A. F. Pierce	54,982
Revolvers, Smith & Wesson	55,250, 55,251
Ribbon, New York Merchandise Co.	55,121
Ribbons, Aitken, Son & Co	54,914
Ribbons, Kohn, Adler & Co.	54,940
Rivets, Judson L. Thomson Mfg. Co.	55,076
Rivets, washers, and burs of copper or brass, Plume & Atwood Mfg. Co.	55,122
Roofing tiles, clay, Ludowici Roofing Tile Co.	55,132
Rubber binding, India, Knapp Rubber Binding Co.	55,085
Rubber boots and shoes, Hood Rubber Co.	55,075
Rubber stair nosings, India, Knapp Rubber Binding Co.	55,086
Rugs, Brussels, Schofield, Mason & Co.	55,008
Rusks, Eerkes-Van Der Maaten Co.	55,240
Sad irons, Dover Mfg. Co.	55,057
Safes, vault doors, and safe deposit boxes, fire and burglar proof, Hall's Safe Co.	55,067
Salad dressing and sauces, E. R. Durkee & Co.	55,239
Sarsaparilla, Cantrell & Cochrane	55,235
Sauerkraut, Clyde Kraut Co.	55,169
Saws, circular and band, Toledo Saw Co.	54,952
Scales, weighing, Computing Scale Co.,	55,147, 55,148
Scissors and shears, F. A. Clauberg & Co.	55,168
Screw drivers, round shank, Stanley Rule & Level Co.	54,951
Scythes, scythe blades, and grass hooks, Hibbard, Spencer, Bartlett & Co.	55,082
Seed, clover, Toledo Field Seed Co.	55,030
Serum, E. Merck	54,995
Shears, sheep and garden, Burgon & Ball.	55,114
Shirt waists and skirts, Waldorf Mfg. Co.	55,142
Shirts, certain named, Regent Shirt Co.	55,136
Shirts, dress and negligee, Columbus Shirt Co.	55,127
Shoes, children's leather and canvas, Beasley Harwood Shoe Co.	55,022
Shoes, leather, G. L. Snow	55,047
Shoes, men's leather, T. S. Ruddock & Son.	55,188
Shoes, women's leather, Beasley Harwood Shoe Co.	55,019, 55,023
Silk dress goods in the piece, Rogers & Thompson	55,138
Silk piece goods, L. & E. Stirn	55,099
Silk piece goods, Home Silk Mills	55,130
Silk pile fabrics, waterproof, Lister & Co.	55,119
Silks, broad, Laurel Silk Works	55,004
Silver and silver-plated hollow ware, flat ware, and tableware, Hibbard, Spencer, Bartlett & Co.	55,072
Silver hollow ware, flat ware, and tableware, American Silver Co.	55,017
Silver-plated hollow ware, B. Rice's Sons.	55,248
Sleds, S. L. Allen & Co.	55,077
Soap, Mazo Manufacturing Co.	55,044
Soap, N. K. Fairbank Co.	55,045
Soap, Compagnie Ray mit beschrankter Haftung	55,079
Soap for the cleaning and dressing of harness, Hoffheimer Soap Co.	54,919
Soaps, toilet, D. S. Brown	55,200
Specific for certain named diseases, Nixie Cough Co.	54,981
Specific for rheumatism, gout, and neuralgia, F. A. Schulz	54,985
Spokes and nipples, Standard Co.	54,949
Steel except steel balls, cast, W. T. Beesley & Co.	55,106
Steel, magnet, Firth-Sterling Steel Co.	55,080
Stout, J. Labatt	55,209
Stoves, ranges, furnaces, and heaters, Co-Operative Foundry Co.	55,054
Stoves, ranges, furnaces, and steam and hot water heaters, Co-Operative Foundry Co.	55,053
Suspenders, A. C. Knothe	55,087
Tea, F. P. Garrettson & Co.	55,177
Tea, Chase & Sanborn	55,236
Teas, New Orleans Import Co.	55,184
Thread of all kinds, cotton, Clark Thread Co.	54,934
Tire bolts and rivets, American Screw Co.	54,928
Tobacco, chewing, Butler-Butler	55,033
Tobacco, long-cut smoking and chewing, Hansen-Schmitt Co.	55,155
Tobacco, pipe and cigarette, Surbrug Co.	55,253
Tobacco pouches and receptacles, certain named, Adolph Frankau & Co.	55,031
Tobacco, smoking, Butler-Butler	55,146
Tobacco, smoking, R. Harris & Bro.	55,156
Tobacco, smoking, J. F. Zahm Tobacco Co.	55,244
Tobacco, smoking and chewing, H. Rippen.	55,249
Toilet preparations, certain named, Dr. J. Parker Pray Co.	54,971
Tonic beverage, C. D. Bradham	55,199
Tonic beverage, celery, S. Levinson	55,210
Tonic remedy for certain named diseases, A. B. Richards	54,983
Tools, certain named edge, Cleveland Twist Drill Co.	55,115, 55,126
Trade journal, monthly, B. Lillard	55,093
Trimmings and braids, dress, Aitken, Son & Co.	54,913
Trowels of all kinds, William Hunt & Sons, The Brades, Limited.	55,109 to 55,111
Undergarments, knitted, Winship, Boit & Co.	55,255
Valves and hydrants, Chapman Valve Manufacturing Co.	54,932
Veilings and chiffons, Aitken, Son & Co.	54,912
Velvet piece goods, Aitken, Son & Co.	54,911
Washboards, Manchester Furniture Co.	55,094
Water closets, urinals, and lavatories, vitreous earthenware, Potteries Selling Co.	55,007
Water, mineral, Wells, Lawrence & Gooch.	55,143
Waters, toilet, Lanman & Kemp	54,993
Wheat meal, wheat, oat, and barley flour, F. Fuller	54,935
Whiskies, Miller Bros.	55,160
Whisky, Bachtold & Ackermann.	55,145
Whisky, Schutz & Klawans	55,162
Whisky, Einstein Bros.	55,172
Whisky, Ellison-Harvey Co.	55,173
Whisky, M. L. Eppstein	55,174
Whisky, P. Freiler	55,175
Whisky, J. H. Friedenwald & Co.	55,176
Whisky, B. S. Greil & Co.	55,179
Whisky, Josselson Bros. & Co.	55,181
Whisky, Chas. M. Pfeifer & Co.	55,185
Whisky, W. Schuman	55,189
Whisky, Sol Rauh & Sons Co.	55,190
Whisky, R. Steel	55,192
Whisky, Wm. H. Holmes Co.	55,193
Whisky, A. A. Wolf & Co.	55,194
Whisky, Mueller, Wathen & Kobert,	55,213 to 55,215
Whisky, W. E. Seel	55,227
Whisky, Bernheim Distilling Co.	55,232
Whisky, J. J. Crowley	55,238
Whisky, Melchers & Effler	55,245

LABELS.

"White Eagle Tea," for tea, A. Kempler.	13,034

PRINTS.

"Captain Kidd Back, Congress Playing Cards," for playing cards, United States Playing Card Co.	1,751

A printed copy of the specification and drawing of any patent in the foregoing list, or any patent in print issued since 1863, will be furnished from this office for 10 cents, provided the name and number of the patent desired and the date be given. Address Munn & Co., 361 Broadway, New York.

Canadian patents may now be obtained by the inventors for any of the inventions named in the foregoing list. For terms and further particulars address **Munn & Co., 361 Broadway, New York.**

WANTED, CHIEF SUB-INSPECTOR (Electrical).—$5.04 per diem. An examination will be held at the Navy Yard, New York, August 22, 1906, to fill the above position. For application and further information address "Commandant, Navy Yard, Brooklyn, N. Y."