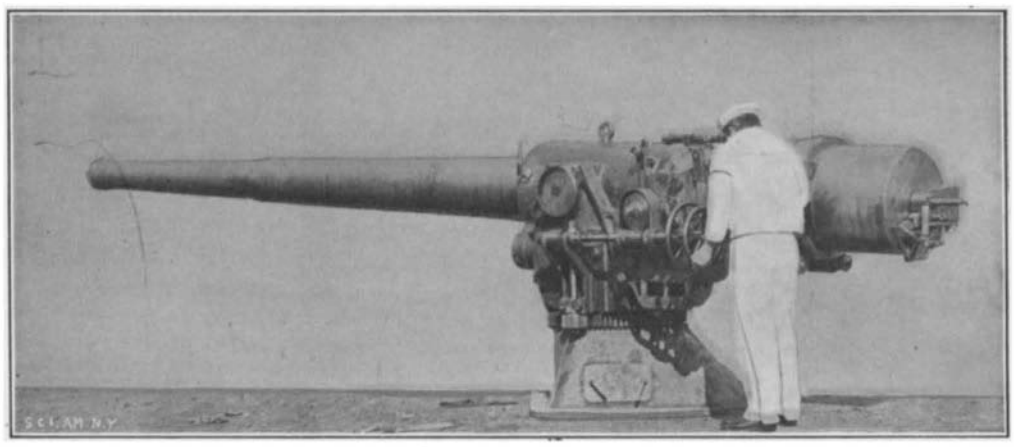
THE NEW 50-CALIBER RAPID-FIRE GUNS OF THE UNITED STATES NAVY.

By the courtesy of Rear-Admiral O'Neil, Chief of the Bureau of Ordnance, we present photographs and particulars of three of the new 50-caliber guns which are being constructed for the United States navy. The weapons here shown have been undergoing tests at the Navy Proving Grounds at Indian Head, and the results as communicated to us are very remarkable, and place the work of the Washington gun factory in the very front rank among the great gunshops of the world. In fact, the Krupp firm is the only one which outranks our navy guns on a single basis of comparison, some of the latest pieces turned out by that firm showing a slightly larger energy of shell per weight of gun than the United States weapons. The Brown wire gun, which was illustrated in a recent issue of the SCIENTIFIC AMERICAN, is expected to show as high, or even higher results than any gun yet constructed; but, as that weapon is at present in the experimental, or rather proving-ground, stage of its development, it can scarcely be classed with the standard accepted types, which are being manufactured, as navy guns are, in large numbers.

The new 6-inch, 50-caliber gun is shown on the latest type of mount, such as will be used on the battleship "Maine" and her class and on all subsequent vessels of the navy. The weight of the gun is 8.45 tons, and of the mount 5.43 tons. The shield will weigh 2.7 tons, making a total weight for the gun complete of 16.58 tons. The piece was designed for a chamber pressure of 17 tons to the square inch, and with a pressure of 16.7 tons it has imparted a muzzle velocity of 3,023 foot-seconds to its 100-pound projectile.

Another photograph shows the new 50-caliber, 5-inch gun, of which sixty are now being made at the Washington gun factory for the six cruisers of the "Denver" class. The weight of the gun is 3.3 tons, and of the mount 2.5 tons. With a charge of 26 pounds of smokeless powder a muzzle velocity of 2,990 foot-seconds was imparted to a 60-pound projectile, the only on having produced a very effective piece, but also one of exceedingly handsome and well-balanced appearance.

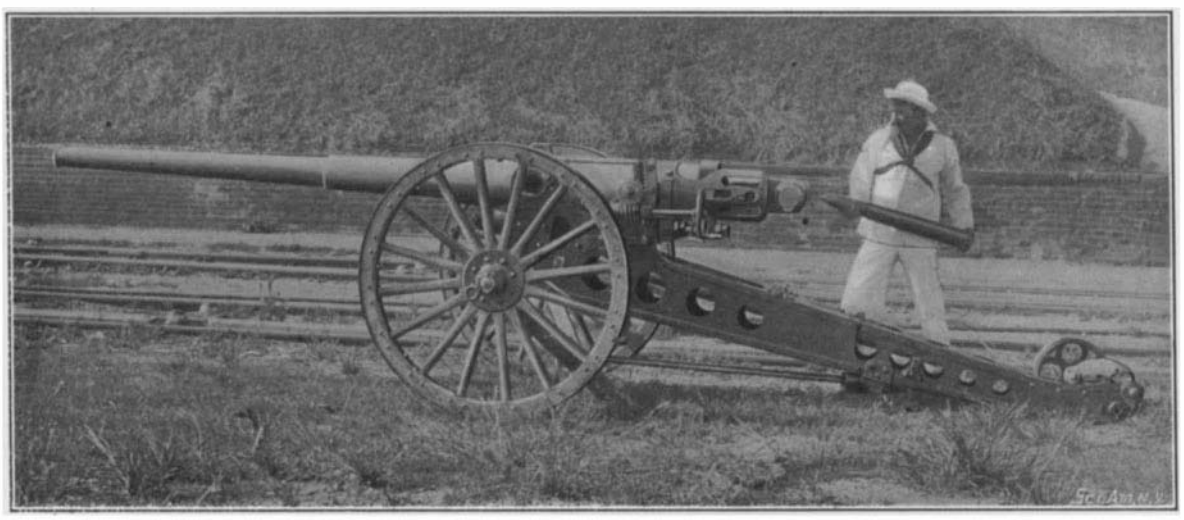
The smallest gun is one of the new 14-pounder, 3-inch, 50-caliber rapid-fire guns, which will form a very important feature in the rapid-fire battery of our new cruisers and battleships. This piece is designed to throw a 14-pound projectile with a muzzle velocity of 3,000 feet per second and a muzzle energy of 874 foot-tons. At the muzzle it is capable of penetrating 13½ inches of wrought iron. All of our later battleships carry—in addition to the 14-pounders mounted in broadside—a pair of 14-pounders mounted on field mounts for use by landing parties. The accompanying illustration shows one of these guns as it will appear when in action.



NEW NAVAL 50-CALIBER 5-INCH RAPID-FIRE GUN.

Electroplated Doors.

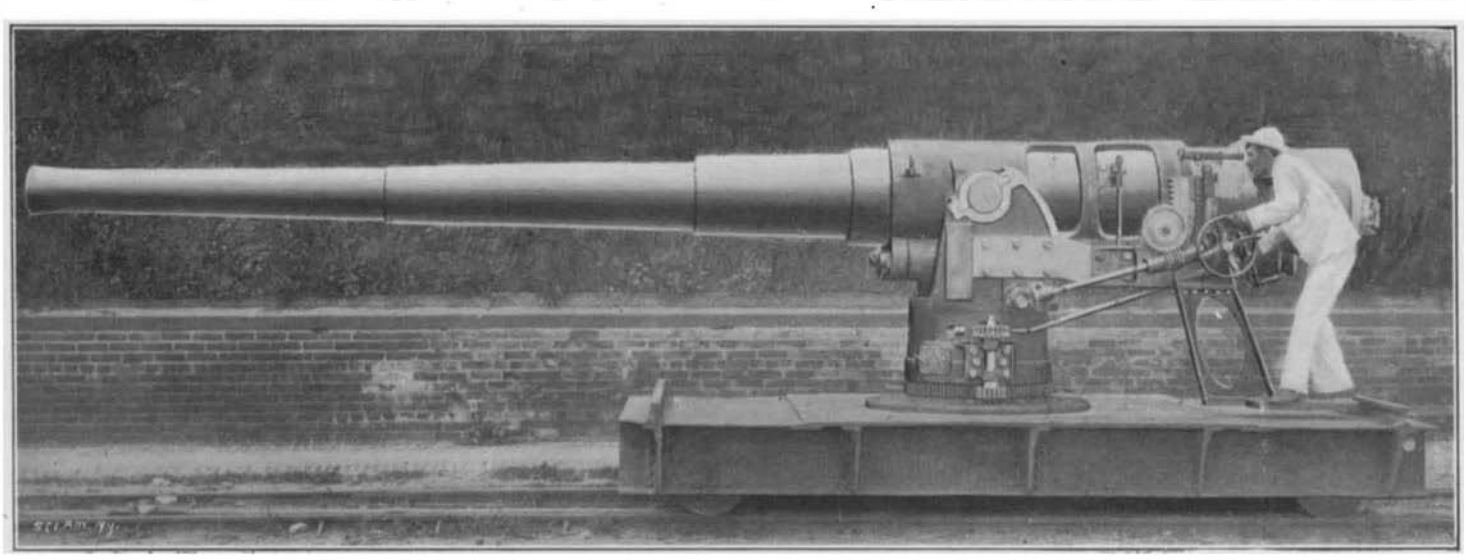
An inventor of Bridgeport, Conn., has just devised a process of electroplating wooden doors with copper, brass and other metals so as to produce a door which is thoroughly inclosed in metal without any visible seams so as to give the appearance of a solid metal door, but which will be cheaper, lighter and generally more desirable than if made of solid metal or covered with sheets, as is now sometimes done. Doors of this class can be extensively used as entrance doors to flats or other large and expensive buildings where massive and elaborate effects are sought. Such doors are considered a valuable adjunct in preventing the rapid progress of fire, and metal-protected doors are frequently used in theaters. There is no necessity of burning off the varnish in order to revarnish, as is necessary with the old methods of covering or protecting. The finished wooden doors are first filled with a wood filler as, for instance, a mixture of linseed oil and resinous gum, which is designed to waterproof and protect the wood thoroughly and prevent warping. The doors are placed in a tank filled with the heated filler which is kept hot by steam. After the filler has thoroughly penetrated the wood they are hoisted, permitted to drain off and laid upon a table for further applications. The door is then rubbed smooth and coated with a varnish as shellac and is then dried. This operation is continued until the desired surface is obtained. The edges of the door are then trimmed with sheet metal strips corresponding to the width of the door. They are attached to the four edges by means of nails, screws, or cement. The material used for the strips is preferably copper, bronze, or brass. The face of the strip on the edge of the door is covered with a metallic insulating varnish, after which the entire door is coated with a metal substance, such as thin metallic leaf, metallic brass powder, or common varnishing wax with plumbago. When the coatings applied have become dry the door is rinsed and is ready to receive the electric deposit. The door is supported in a vertical position in the plating bath. One wire goes to the anode, and the second wire is preferably attached to the metal strip on one edge of the door; the current is then turned on, and the electrolytic action takes place until the surface is covered to any desired thickness. The advantage obtained by covering the edges of the door with a sheet metal strip is that its high conducting power makes a complete circuit around the door, and the width of the strip insures an even and unbroken surface between the two sides.



NEW NAVAL 50-CALIBER 14-POUNDER FIELD GUN.

chamber pressure being 16.4 tons, or 0.6 of a ton to the square inch less than the pressure of 17 tons per square inch, for which the gun was designed. With a pressure of 16.75 tons to the square inch in the powder chamber, a muzzle velocity of 3,330 foot-seconds was imparted to a 50-pound projectile.

Both of the above guns are fitted with the very latest improvements to facilitate rapidity of loading and secure accuracy of fire. These features are shown in the photographs of each gun, particularly in that of the 6-inch gun. In the case of the last-named piece the gunner stands on a platform which is bolted to the gun-carriage immediately to the left of the breech, and consequently, as the gun is traversed, the gunner moves with it and is always in the same relative position to the piece. Conveniently for manipulation are placed two hand-wheels, one operating the elevating gear and the other the traversing gear. In front of the gunner's eye is seen the telescopic sight—an important feature in all modern ordnance. The gun itself recoils in a sleeve in which are formed the trunnions and at the bottom of which, and cast in one piece with it, are the hydraulic recoil cylinders, the pistons of which are connected by piston rods to the breech of the gun. The guns are fitted with an improved and greatly simplified pattern of breech-block, which is unlocked and opened by a single swing of a lever. The Ordnance Department is to be congratulated not

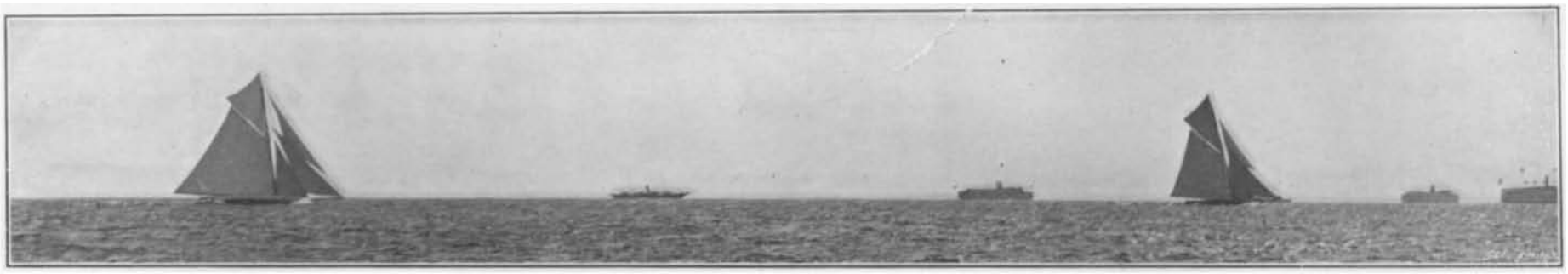


NEW NAVAL 50-CALIBER 6-INCH RAPID-FIRE GUN.

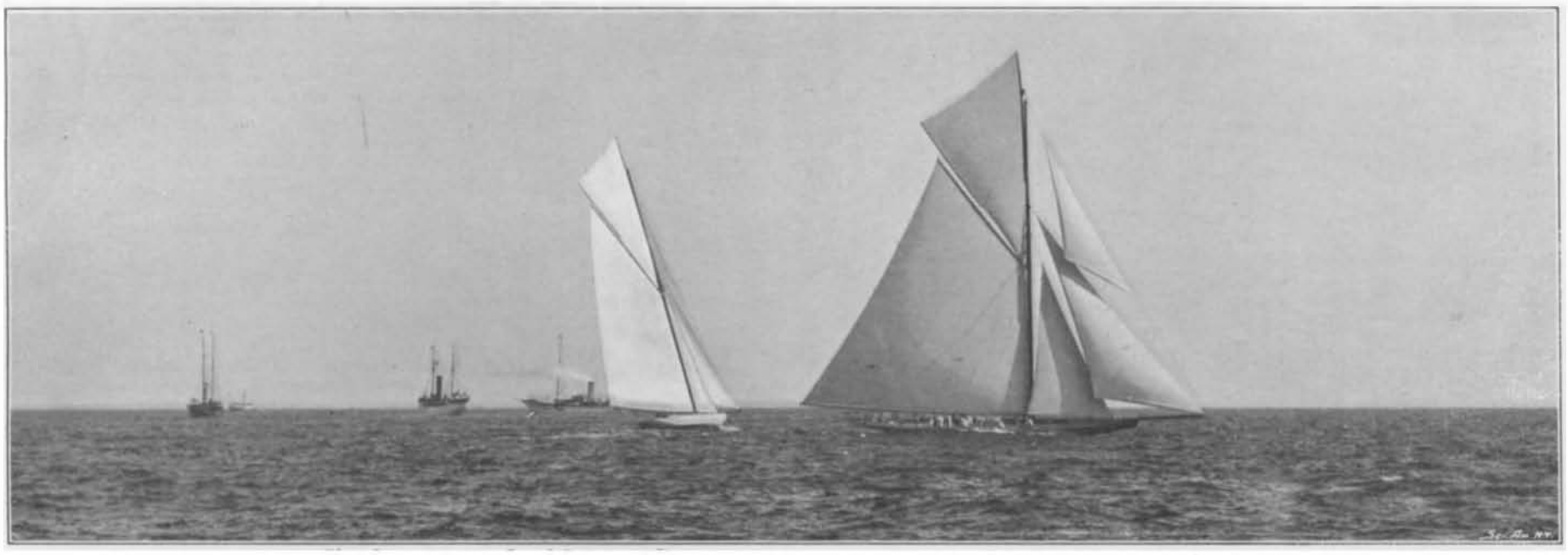
THE 1901 CONTEST FOR THE "AMERICA" CUP.

In all the half century during which contests have been waged for the "America" Cup there was never fought out such a close and exciting struggle as took place in the first race of Saturday, September 28, and the last race of October 3. On the former day, from the moment when the yachts crossed the starting-line practically abreast, to the boom of the finishing gun—4½ hours later—when the winner was only three or four lengths in the lead, there never was a time when the yachts were more than a stone's-throw apart, while there was more than one occasion when the proverbial biscuit could have been tossed from one yacht to the other; and in the last race the yachts finished practically abreast.

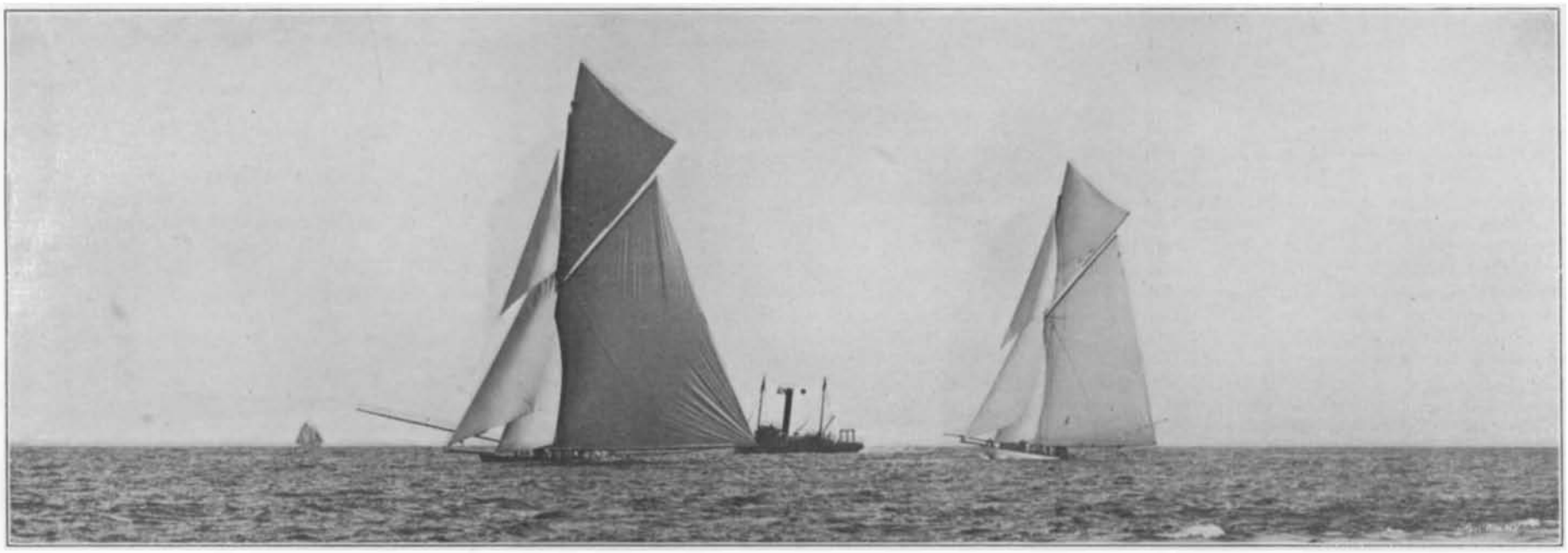
The conditions were more favorable to the "Shamrock" than on the previous Thursday, when there was not enough wind to finish. The sea was much quieter and the breeze stronger, although the latter was never over eight knots in force, and fell at times as low as four or five knots. After some exceedingly clever maneuvering by the rival skippers, they crossed the line practically abreast, with "Shamrock" in the weather berth and two seconds in the lead. It was confidently expected that on the 15-mile beat to the weather mark "Columbia" would pull out from under the lee of the challenger and widen the gap on every board that was sailed. She had hitherto shown herself to be invincible in beating, and most of her victories over "Constitution" had been made on this point of sailing. To the surprise no less of her people than of the great majority who believed "Columbia" to be invincible on this point of sailing, "Shamrock" appeared to point as high and foot as fast as the



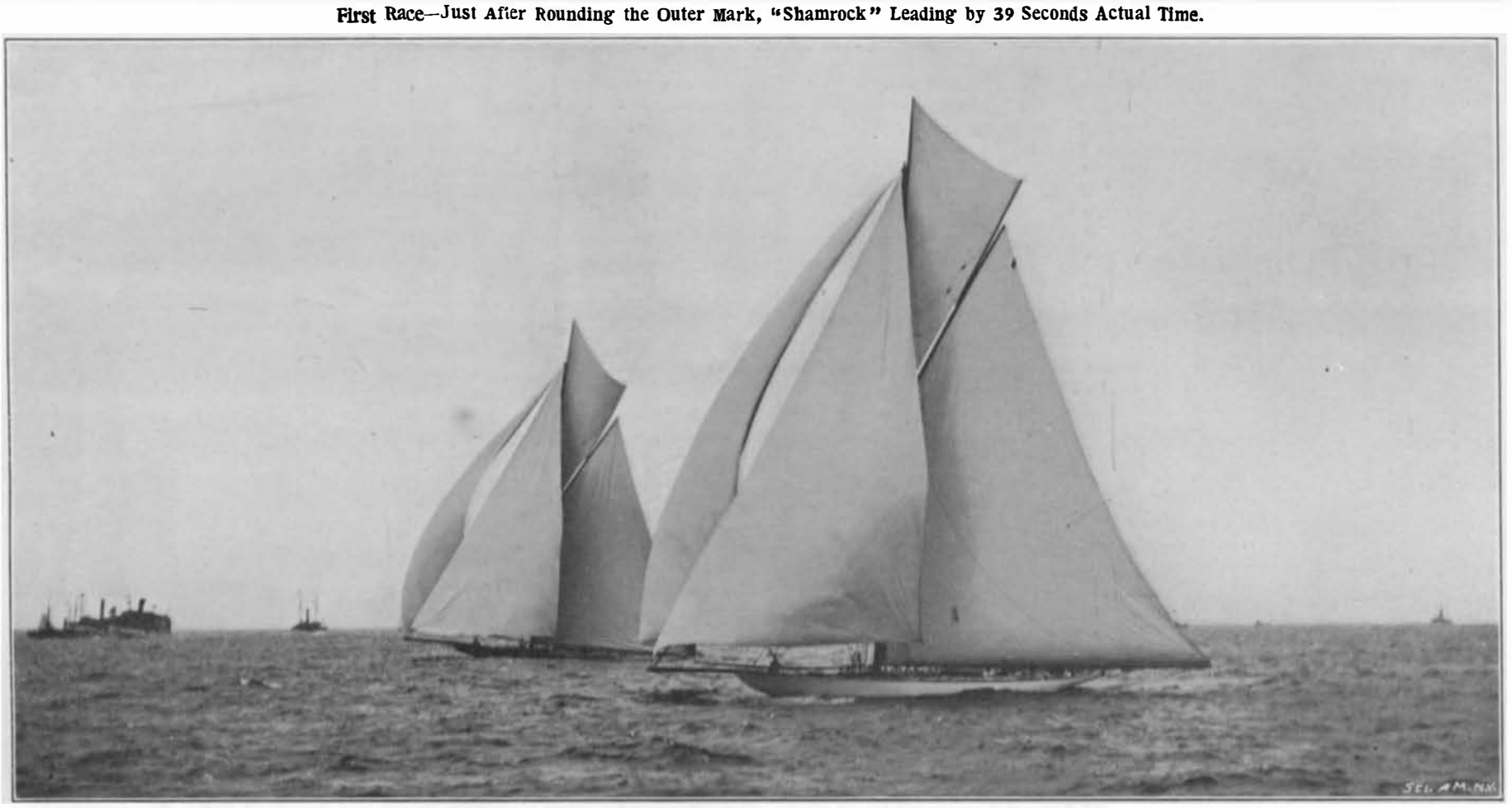
The Triangular Race of Thursday, October 3—Ten Minutes After the First Turn, "Shamrock" Leading.



First Race, Windward and Return—"Shamrock II." Going About on the Port Tack, Just After the Start.



First Race—Just After Rounding the Outer Mark, "Shamrock" Leading by 39 Seconds Actual Time.



The Finish of the First Race, "Columbia" Winning by 37 Seconds Actual Time.

THE 1901 SERIES OF "AMERICA" CUP CONTESTS.

American boat, and when, after half an hour's sailing on the starboard tack, "Columbia" put about in the effort to cross the English cutter's bows and failed to do so, it was evident that, in a moderate breeze and fairly smooth sea, "Columbia" had at last met her match in windward work. Three times "Columbia" made an unsuccessful attempt to gain the coveted weather berth. She would be eased off and given a "rap full" in the endeavor to draw far enough ahead to cross her opponent's bows; but the boats were too evenly matched to render this possible. On the last board "Shamrock" was pinched so high into the wind that her captain was able to come down to the mark with started sheets, and most of the gain of 39 seconds was made at this time.

The outer mark was rounded by "Shamrock" at 1 hour 25 minutes 12 seconds, and by "Columbia" at 1 hour 25 minutes 53 seconds, or 41 seconds later. Deducting the two seconds' advantage of "Shamrock" at the start, the actual gain was 39 seconds.

Immediately on rounding the stake, "Shamrock" luffed, in order to escape a blanketing by "Columbia." The American yacht also luffed, and for several minutes both vessels kept up the canvas with which they had gone to windward mark. One of our illustrations was taken at this time, and shows how the rival skippers were waiting on each other to break out the spinnaker for the run down the wind. Five minutes after rounding, this large triangular sail and also the largest jib-topsail were broken out on each yacht, and they were fairly on the home course.

Although the "Shamrock" was 39 seconds to the good in actual time, she had to allow the "Columbia" 43 seconds on the 30-mile course, and therefore she was at this time just 4 seconds to the bad on corrected time. Hence it was necessary for her to gain a few seconds more on the 15-mile run, if she was to win the race. Popularly, it was supposed that, with her extra 800 square feet of sail area, she would easily do so; but, as a matter of fact, the wetted surface of "Shamrock" is considerably greater than that of the American boat—so much so that the extra skin-friction overbalanced the extra driving power of the sails —and slowly the "Columbia" began to gain. Before many miles had been covered, the yachts were abreast and then "Columbia" drew slowly ahead. So close was the race, that "Shamrock" drew up again on even terms within three miles of the finish, and it was only when the finishing gun boomed that it was made certain that the American boat was the first over the line. Thus was won, by a margin of 1 minute and 20 seconds, corrected time, and 37 seconds, actual time, the most closely contested and exciting race in the history of the Cup.

In the second race, sailed on Thursday, October 3, the "Shamrock" was favored with the very conditions of wind and sea and course under which her friends have claimed that she would do her best sailing. The wind was blowing from off shore at an average strength of 15 knots, with occasional puffs in which it rose to fully 20 knots. The sea was smooth, and the course, a triangular one, was laid out so that the first two legs would consist of reaching and the last of a beat back to the starting-point. "Shamrock" crossed the line at the start with a lead of 1 minute 34 seconds; she took 50 minutes 57 seconds to reach the first stake, and turned it 1 minute 12 seconds ahead of "Columbia," the American yacht having gained 22 seconds in the ten miles. The second leg was covered by "Shamrock" in 54 minutes 41 seconds, and she turned the stake with a lead of 48 seconds, having lost 24 seconds on the second leg. She was now 2 minutes 5 seconds to the bad including 43 seconds handicap, and it remained to be seen whether she could gain something more than that amount on the 10-mile beat to bring her home a winner. The issue was not long in doubt. As she turned the stake, the challenger kept on the starboard tack, waiting to see whether the "Columbia" would follow, or elect to make a close turn and put about on the port tack. The move was fatal to her chances of maintaining her weather berth, for "Columbia" put about immediately on rounding; and, although "Shamrock" immediately followed suit, "Columbia" had no difficulty in sailing through her lee into the weather position. It was soon seen that the American yacht pointed higher and footed equally fast, and it now became merely a question by how much she would win. Both boats drew home to the Sandy Hook Lightship on the starboard tack and crossed the line with a smother of foam at their bows and their lee rails awash. "Columbia" crossed at 2 hours 15 minutes 5 seconds, and "Shamrock" at 2 hours 16 minutes 24 seconds, the challenger having lost 2 minutes 5 seconds on the 10-mile beat. Adding the time by which "Shamrock" was ahead at the start and the time allowance, 43 seconds, "Columbia" won the second race by the safe margin of 3 minutes 35 seconds. The race, while not so close as that of the previous Saturday, was more spectacular. The yachts at times, in the heavier puffs, would heel to an angle of 40 degrees, and the water would come boiling over the lee bow and sweep the full length of the deck. It was a magnificent test, in which the better boat won out on its merits.

Close as was the first race of the series, the third race, sailed on Friday, October 4, was even closer and more exciting, the "Shamrock" covering the course in 20 seconds less time than the Columbia, but losing the race on corrected time by 41 seconds. The wind was of about 10 knots' strength at the start falling to about 6 knots at the finish, and the course consisted of a 15-knot run to the outer mark and a beat back.

Although the race of the previous day had satisfied the yachting "sharps" that "Shamrock" could not win under any conditions, the race of Friday was not fifteen minutes old before it was seen that in running before a 10-knot breeze "Columbia" had more than met her match. Both boats crossed the line outside of the handicap time and were therefore timed at 11 hours 2 minutes; but "Columbia" had an actual lead of 18 seconds. "Shamrock" immediately began to overhaul her, and passing her to port drew ahead so fast that after an hour's sailing she had a lead of two minutes or over a quarter of a mile.

Each yacht had the wind perfectly clear, and as "Shamrock" was luffed well clear of "Columbia" it was evident that if the wind held true at the rate she was gaining she would lead at the outer mark by at least four minutes. This would be more than even "Columbia" could hope to cut down in windward work. The wind, however, gradually lightened, and then freshening to over 12 knots it brought up the following boat with a rush, and before "Shamrock" caught the puff her lead had been cut down to less than 15 seconds. Again she began to pull out, and finally she rounded the stakeboat with a lead of 49 seconds. Then began a magnificent struggle to windward in which "Shamrock," to everyone's astonishment, increased her lead for the first 10 miles, when the yachts split tacks and "Columbia" went over to the Jersey shore in search of the stronger puffs. At 2:40, after two hours of tacking, the yachts met on opposite tacks, and "Shamrock" forced "Columbia" about, and at 3 hours 17 minutes they met again with a like result. The remaining quarter of an hour was a most exciting struggle for the finish, the yachts finally crossing the line abreast, with "Shamrock" in the lead by two seconds.

Thus ended the twelfth and most hotly contested series of races ever sailed for the "America" Cup. It finds the "Shamrock" defeated, but carrying the honor of having in each race been the leading yacht at the outer marks. She also may find consolation in the fact that, with the single exception of "Valkyrie II," she is the only challenger that has been able to hold the American boat under her lee in a 15-mile beat to windward. Twice she did this; and she will receive from American yachtsmen all the credit due to a craft that can perform such a feat against a yacht of such splendid windward qualities as "Columbia."

As for "Columbia," she may be safely set down as the most successful all-round Cup yacht that ever hoisted racing canvas—a yacht that is so good that her own designer was unable to build a boat to beat her.

Balloon Trip Across the Alps.

An important balloon trip is that which is shortly to be undertaken by Capt. Spelterini, who proposes to cross the Alps, starting from Saint-Moritz-les-Bains. The envelope of the balloon which is to make the traject has been ordered from August Riedinger, an Augsburg constructor. It will be composed, like the German military balloons, of two layers of canvas separated by a thickness of caoutchouc. The balloon is to have a diameter of 45 feet and a volume of about 1,800 cubic yards, and will be filled with hydrogen. The gas will be brought to the place in steel cylinders containing 170 cubic feet each and weighing 150 pounds. These cylinders have been loaned by Count Zeppelin and filled at the Gmür establishment, at Lucerne, at a pressure of 150 atmospheres. To fill the balloon about 350 of these cylinders will be needed, representing a total weight of 22 tons. It is estimated that it will take about 5 or 6 hours to fill the balloon from these cylinders.

The new system of aerial telegraphy from automobiles, designed by Marconi, is said to have been quite successful during the last military maneuvers in England. Two automobiles are each provided with a mast and contain the necessary instruments for aerial telegraphy, and may thus communicate at a considerable distance. The vehicle used is a steam omnibus of the Thornycroft pattern, weighing 5 tons and giving an average speed of 10 to 15 miles an hour. The mast wires are mounted upon an insulated metal cylinder which is supported on the roof of the vehicle toward the front. The cylinder, which is about 23 feet high, can be folded down when not in use. It is thus possible to telegraph between the automobiles while they are in movement, and this had already been done with success. Messages can be received at a maximum distance of 20 miles, but Marconi claims that this can be considerably increased.

Experiments with Phosphorescent Bacilli.

M. T. Tarchanoff has made a number of experiments upon the phosphorescent bacilli of the Baltic Sea, with a view of determining the influence of different conditions upon their luminous activity. The fresh cultures of these bacilli give the strongest light, especially when the bouillon is in movement and becomes mixed with air. The luminous capacity of the bacilli lasts for periods varying between two or three weeks and two or three months, according to the conditions of the containing substance and of the external atmosphere. The emission of light by these bacilli is one of the manifestations of their respiration, and is intimately connected with their consumption of oxygen. The light appears to be periodic in character, but without any regularity in its periods. In a state of repose the luminous layer is concentrated in the upper layers of the bouillon. This is accounted for by the proximity of these layers to the air, and also by the active movements of the bacilli, which direct them toward the oxygen. A series of movements or shocks given to the bouillon illuminates its whole mass, on account of the introduction of air to the interior, as well as the fact that the shocks act as an excitant. The influence of temperature is another point. The bacilli will resist cold much better than heat. The best temperature is found to be from 7 to 8 deg. C. They will, however, still give off light as low as —4 deg. C., and even in part during the complete congelation of the bouillon, which takes place at —6 to —7 deg. The remarkable phenomenon of a "luminous ice" is thus observed. The phosphorescent bacilli in the icy medium thus preserve their vitality not only in the latent, but in the active form, with emission of light. After a few hours the luminosity of the ice becomes extinct, but when the bouillon is remelted it again becomes luminous. The ice under these conditions has been photographed by its own light, by applying it against the sensitive plate, with a separating plate of glass between it and the film. As regards high temperatures, it is found that heating the bouillon weakens the light, and it becomes wholly extinct at 34 to 37 deg. C., coming back upon cooling. When heated as high as 50 deg. the luminous effect is destroyed once for all. Chemical agents have also a marked influence. Anæsthetics, such as chloroform or ether, destroy the light almost instantly, but on the other hand, many of the poisons, such as strychnine or curare, appear to be indifferent. Cyanide of potassium extinguishes the light, as well as chlorhydrate of quinine, which diminishes oxidation in general. A current of carbonic acid gas has the same effect. The acids are more hurtful than the alkalies. Of the animal humors the bile has the greatest effect, owing to the biliary salts which it contains. Blood, lymph, saliva and pancreatic juice are almost indifferent. The gastric juice and the intestinal secretion have marked and contrary effects; the former, owing to its great acidity, quickly destroys the light of the bacilli, while the latter seems to be the only chemical agent which will increase the luminosity. This effect is not due to its alkaline nature, but more probably to its ferment, which M. Pawloff has shown to be extremely energetic. When an electric current is passed through a tube containing the bouillon, the luminosity becomes localized in a few minutes at the negative pole, where it finally disappears. The bacilli seem to be dragged in the direction of the current, in spite of their natural tendency toward the oxygen, which is found at the positive pole. In a tube which has become extinct by the action of the current the bacilli have not lost their vitality, for the introduction of a bubble of air generally brings back the phosphorescence. Mechanical shocks, such as oscillations, given the tube, or strokes up to 50 per second, increase the effect at first, but after some time they weaken or even extinguish it. A bubble of air will restore the light as before. One of the most singular experiments made by M. Torchanoff was that of the "luminous frog." This is obtained by introducing a small quantity of the bouillon into the dorsal lymphatic sac of the frog, when the liquid penetrates into the neighboring lymphatic sacs and into the blood, and gradually illuminates the whole of the animal, especially the transparent parts. The tongue of the frog shines the most brilliantly, owing to its sac, which contains a luminous lymph. A photograph of the frog is obtained by applying it against the plate (with a glass plate between), and the contours of the animal are found to be the best defined in the negative. The phosphorescent bacilli thus find in the humors and organs of the frog an oxygenized medium which is favorable for their existence. Nevertheless, the luminosity becomes extinct after three or four days, as the bacilli are probably destroyed, and the animal comes back to its normal state. It is to be remarked that this experiment will not succeed in the case of warm-blooded animals, as the phosphorescence of the bacilli is extinguished at a temperature of 36 to 38 deg.

Suez Canal Figures.

The figures for the navigation of the Suez Canal show that out of 3,441 vessels which passed through it in 1900, as many as 3,139 are classed in the night passage, partly by the aid of electric light, or 91.2 per cent, and only 302 vessels, or 8.8 per cent, for the day passage. For the last eight years the comparative results of the day and night navigation are given in the following table, the second column representing the number of vessels which passed the canal partly by the aid of electric light, and the third column shows the number passing by day:

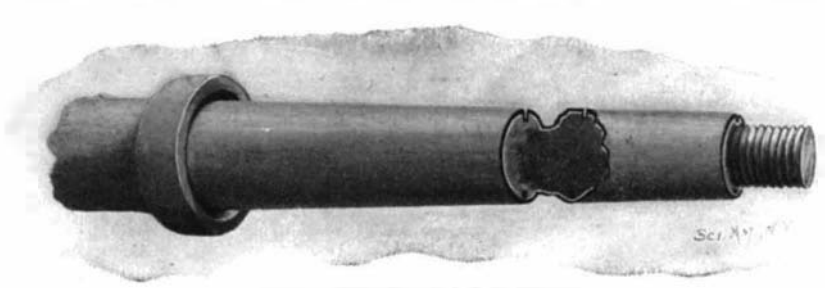
	Night Passage.	Day Passage.	
Year.	Vessels.	Vessels.	Total.
1893	3,082	259	3,341
1894	3,180	172	3,352
1895	3,266	168	3,434
1896	3,211	198	3,409
1897	2,837	149	2,986
1898	3,294	209	3,503
1899	3,273	334	3,607
1900	3,139	302	3,441

A SKEIN FOR WAGON AXLES.

To provide a means for protecting axles from the enormous wear to which they are subjected, Mr. Fritz A. Schulz and Mr. Alfred J. Koetschau, of 212 Humboldt Street, Chicago, Ill., have patented the simple skein illustrated. At diametrically opposite sides of the journal longitudinal grooves are made, which are intended to serve as a means for locking the skein in position.

The skein itself consists merely of a sheet of metal having flanges at its side edges, which sheet is curled, so as to form a split tube. Thus bent, the skein is tempered so that it becomes essentially a spring. The spring tube thus formed is slipped over the journal in such a manner that the flanges previously mentioned will enter one of the longitudinal grooves of the journal. The wheel can now be placed in position; and the wear will be taken up entirely by the skein. The groove in which the flanges of the skein are received serves admirably as a grease-duct. Should the bottom of the skein become worn, as will very likely happen with continued use, the skein is taken off and turned half way around so that the flanges are locked in the other groove. The wear of the wheel will now be borne by the other side of the skein.

This simple device has been subjected to severe tests and has proved itself highly efficient. It has been found that axles which are to be provided with skeins need not be finished, but can be left rough. It has also been found that the skein can be very easily applied to old axles without making any changes in the hubs of the old wheels. If many of the devices at present on the market be used the bore of the hub must be enlarged in order to fit over the skein. The present invention obviates all such difficulties.



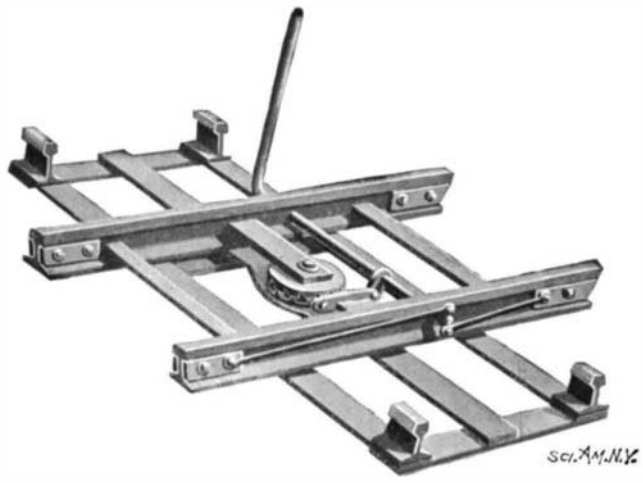
A SKEIN FOR WAGON AXLES.

TURNTABLE FOR HAND-CARS.

The accompanying illustration pictures a novel turntable invented by Thomas Langley, of Corvallis, Oregon, which turntable is intended to shift a railway hand-car from the main track to a side track, or to a track leading into a shed.

Between the adjacent ends of the main track-rails, a base-frame is extended. On the base-frame a turn-plate is mounted, having ratchet-teeth on its upper side. Engaging with the turn-plate is an upper plate having ratchet-teeth on its under side. This upper plate is connected with one of the cross-bars which connect the turntable rails, as our illustration shows. A shaft mounted to turn in the turntable-rail is provided with an arm having connection with the turn-plate, so that a rotation of the shaft will also rotate the turn-plate. At the ends of the turntable-rails, fish-plates are mounted, so secured by bolts passing through slots in the rails that they have a limited sliding movement. Links extend from the bolts to crank-arms on the shaft previously mentioned, the arrangement being such that when the shaft is turned the fish-plates will be drawn inwardly along the turntable-rails. The shaft is operated by an arm.

When the turntable is in closed position its rails will be in alinement with the main track-rails, its fish-plates will extend across the gaps between the turntable and main track-rails, and the arm of the shaft will lie horizontally beside the adjacent turntable-rail. If it be desired to open the turntable for the purpose of shifting a hand-car to a siding, the shaft-arm is swung up, thereby retracting the fish-plates so that the table is free to turn, and rotating the turn-plate so that its ratchet-shaped teeth, by sliding on the inclines of the teeth of the upper plate, will raise the upper plate and elevate the turntable. When the parts are in this position the turntable with the hand-car thereon can be easily moved to open parts.



THE LANGLEY TURNTABLE.

Labor Conditions in Germany.

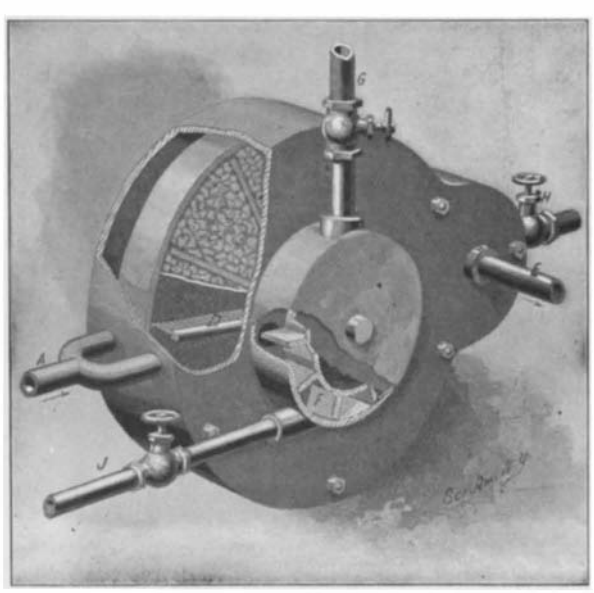
Under date of August 21, 1901, Consul-General Hughes, of Coburg, reports:

The Berlin semi-monthly periodical Der Arbeitsmarkt (The Labor Market) furnishes facts and figures which show that there is a continuous scarcity of work in Germany. From the mining district and from the centers of the iron-working and machine-making regions, short hours, dismissals of hands, and the cutting down of wages are reported. In the month of July, 1900, when the depression of business in general was felt for the first time on the labor market, the decrease of employed laborers amounted to only 3 per cent, while in July of this year their already much reduced number has decreased by a further 3 per cent. There is a marked increase in the number of men applying for work at the public labor offices. In July, 1900, for every 100 open places 122.2 applicants were counted; this year their number has run up to 160.9. The labor offices report an increased rush for places, particularly by metal workers and those employed in the building trade (Bauarbeiter). The latter may hope for an improvement, at least in some places, at the beginning of the autumnal building season, but for the iron workers the outlook is gloomy, indeed.

A NOVEL FILTER.

A simple durable filter that can be readily cleaned without the necessity of removing any part forms the subject of a patent granted to William E. Corlett, of Jennings, Oklahoma Territory.

Within a cylindrical casing a filter, *C*, is mounted, which may be described as a drum, the heads of which are formed of tripoli rock or other filtering material. This drum is divided into a number of radial compartments, which are filled with rock. The water to be filtered is supplied by a pipe, *A*, to the outer cylindrical casing; percolates through the heads of the filtering drum, whereby the coarser impurities are removed; flows through the rock-filled radial compartments; and emerges from the discharge-pipe, *E*, communicating with the drum, as a thoroughly purified stream.



A NEW FILTER.

The coarse impurities that cling to the drum-heads are removed by means of brushes, *D*, carried by a shaft passing loosely through the outer cylindrical casing and the drum. The shaft is driven by a water motor, *F*, which receives its water supply from a valved pipe, *J*, and which discharges the spent water through a pipe, *H*. When the water-motor is driven, the brushes, carried by the motor-shaft, are made to wipe off the material clinging to the drum-heads. The impurities thus brushed off drop to the bottom of the outer cylindrical casing, and can be drawn off by way of a valved discharge. It is therefore evident that the apparatus need not be taken apart to clean the filtering-drum.

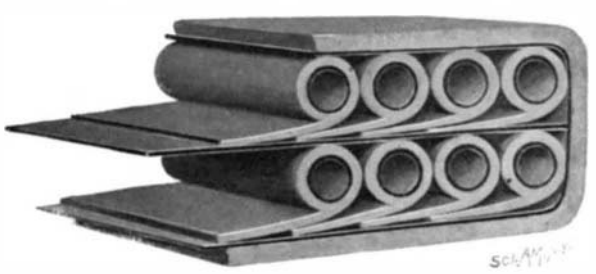
The inclosing shell of the motor communicates with the outer cylindrical casing of the filter by means of a valved opening, so that, by closing the discharge-pipe of the motor, the water ordinarily used for turning the shaft can flow into the outer cylindrical casing of the filter for purification and discharge through the pipe, *E*.

A FIREPROOF PIPE COVERING.

A non-heat conducting and fireproof covering to be used in buildings, steam-fitting and in every other connection in which it is desired to protect one part from heat or fire at another, is the subject of an invention recently patented by Maurice Sullivan, of Corona, N. Y.

The covering consists of a sheet of asbestos rolled to form a tube, but also to leave a tangentially projecting wing, as it were. Upon this projecting portion the tubular covering of another pipe is laid, and upon the projecting sections of this second pipe the tubular casing of a third pipe is laid, and so on. A number of sections can be laid together in the same plane to form a flat, board-like structure, which can be used for walls and other similar structures and buildings. The tubular sections are placed side by side in the manner described, and covered on both sides by a sheet of asbestos or other material. Any number of sections can be joined together to produce a covering of the proper size.

Our illustration shows two layers of pipes to which the covering has been applied. In this arrangement strips of paper are laid next to the tubes, and between the layers; and around the whole is placed a covering of asbestos. These parts are assembled or otherwise secured together to form a rigid and stiff structure.



A FIREPROOF COVERING FOR PIPES.

The covering is also especially useful for columns, between pillars and the like, and also for ceilings, floors, and walls. It is hardly necessary to describe these various applications in detail, since they are more or less similar to the application already described and illustrated.

The Current Supplement.

The current SUPPLEMENT, No. 1345, contains a number of articles of great interest. "Use of Steel in Concrete Construction" is an elaborately illustrated article. "Vanishing Venice" is by Alfredo Melani. "Fatalities of Mountaineering" dscribes serious accidents which have occurred on the mountains of the world. "Methods of Curing Tobacco" is by Milton Whitney, Chief of the Division of Soils. "A Remnant of Buddha's Body" is by Perceval Landon. "The Cluchagne System of Military Rafts and Bridges" describes a new system of floats. "Marine and Estuarine Deposits" is an especially reported lecture by Prof. W. B. Scott. The inaugural address of Prof. A. W. Rücker, President of the British Association, is begun in this issue. "The Steam Coach in 1825" is by R. I. Clegg. "American Locomotives in England" is the sixth in the series.

Contents.

(Illustrated articles are marked with an asterisk.)