

Macfarland as he looked at the group of noted international lawyer, who had gained of the three kinds of insects that annually young school graduates at Convention Hall of this country, was selected as the repre-

Certainly one of the most unique sights most any one would say, who was there, for just at that time those on the stage had been presented with the flowers which relatives and friends give to the happy students on this gala occasion

All at once this expanse, which had been deminated by the quiet contrast of the white dresses of the girls and the black suits of the boys, flushed into a glow of color. As the great masses of flowers were shifted about from hand to hand it suggested the process of the arrangement of some gigantic bouquet. At times there was hardly a face to be seen, only the moving kaleidoscope of great beauty and variety. After a while the flutter caused by the delivery of the gifts subsided, and as the boys and girls held in their arms their treasures, the immense platform became a flower garden, a sloping bank of blooms

"The nearest approach to the daily crush at the New York end of the Brooklyn bridge that I have seen in this city," remarked a visitor to a Star reporter, "occurs at the Rock creek railroad loop every evening when the weather is hot. There is the same mass of humanity, the same scramble and the same mad get-there-anyway idea. The cars of both lines are crowded to the utmost, and the rush to get on the outgoing cars is so great that the passengers who have come in have actually to fight their way to the street. It's anything to get on, and the strangest part of it is that the crowd is mainly composed of ladles and children. They attack the car before it has stopped and climb aboard any old way, the more active pulling themselves up under or over the side bar designed to close the track side of the car. Although somewhat undignified, it is an interesting sight, and more exciting than a bargain crowd rampant. The wonder is that some of the reckless people are not injured, and they undoubtedly would be but for the efforts of the railroad agents in constantly pushing them off the tracks and out of the way of the constantly moving trains.

ment of any sort, but there are always new examples of the fact turning up. There is store in Georgetown. Of course during the for green grocers and dealers of that sort to keep their perishable goods on ice. The dealer in question consequently keeps the fish with which he supplies that part of Georgetown on ice in his refrigerator. Not to let any one overlook the fact that he was still selling fish, he recently lettered a sign himself reading:

"Fresh Fish Inside." But some small boy-it could not have been any one but a small boy-came along with a lead pencil and added an "s" to the word "inside" in very much the same sort of scraggy lettering that characterized the rest of the sign. The result is that the announcement has a rather uncanny sound, reminiscent of codliver oil and the giblet chowders so popular on the New England

There is a young fellow among the correspondents in Washington who is not much leaned absentmindedly on the edge of the soda counter and made several passes with his starboard foot at the bottom on the

"What in the world are you trying to do? asked one of the girls. Then the young man woke up and slightly blushed. "Oh, nothing at all," remarked the other rail that's all."

"And now the girls are wondering whethsoda fountain counters.

Secretary Wilson of the board of charitles about eight months ago took a poor half-demented colored man from Washington to the home of his relatives in Mississippi. The man had been a ward of the the board had provided his clothes, a lodging place and food for him as well as medquite fond of the board of charities as represented by Secretary Wilson, and in his opinion that official was about the kindest man and the most generous that had happened since the beginning of time. The other day Secretary Wilson received

a letter from the former ward of the board. man had been working on a farm down in Mississippi, and continued as follows: "I wish you would send me a couple suits of clothes, a barrel of potatoes, three sacks of flour, a butt of chewing tobacco and a five-gallon jug of whisky. I am needing the things, especially the whisky. If you can't send the other things, send the whisky, and if you can't send me five gallons, maybe I can git along with a gallon. Hoping you

"P. S .- Don't forget the whisky."

"It don't do to underestimate the mental capacity of the men that the republics of South America have gathered into their official families," declared a globe trotter who was observing the joint army and navy maneuvers at Old Point last week. "One of the brightest men I ever met had a minor position with one of those republics. character, customs, politics, press, com-In the diplomatic service, I think. At least | mercial methods, manners, literature and he was doing or trying to do a diplomatic stunt when he made one of the wittlest re-

torts I think I ever heard. "It was on the occasion of one of those and developments of the moment are not constantly recurring European-Latin Amer- of English origin.

From Punch.

"The most beautiful sight in Washing- ica embroglios, when the United States had ton," was the comment of Commissioner | stepped in and offered its good services. A considerable fame in the diplomatic service | do the greatest amount of damage to the sentative of the South American republic which happened to be the defendant in the

case at that time. "He was one of those bluff Yankees who managed to carry his point wherever he went; one of the unique characters that sometimes get into the foreign service, who have accomplished things through the sheer force of their intellect. He had no tact or diplomacy and blurted out what he had to say in very forceful English. Now the little South American of whom I spoke at the beginning was in the service of the a serious menace to the city's plant life. republic which this American lawyer had It was this eaterpilular that was assobeen selected to represent, and his particular department had much to do with the case at court.

"When the American lawyer reported for duty therefore and started in to settle matlittle friend thought that while he might cies, found in the region from Canada to not be of any use, at the same time it would only be proper and courteous for the records of the division of entomology that fairly rioted in the luxuriant coloring him to offer his services to the distinguished list about 120 species of shade and ornaforeigner, who, for the time being, was in mental trees, as well as fruit trees, upon the service of his country. Therefore he got himself up in all the style he could command, top hat, frock coat, highly varnished shoes, etc., and made a call on the lawyer. He was received by that individual with a bluff, 'Well, what can I do for you?' offer your excellency the services of my poor self and my department for anything you may want to use us,' was the reply, with all the South American effusiveness, which I cannot remember. "'Ugh-ugh,' replied Mr. American Law-

yer, looking the little South American over with his eagle eyes carefully. 'You do, eh?' A long pause while the inspection continued. Well, who's your tailor?'

"The question was so out of place and so suddenly put that my friend's breath was taken away for a moment, but he ing fences or to rubbish and sticks and smiled that sweet smile of Spanish diplo-macy and with all the courtesy he could muster, softly replied: "I was not aware that short-sleeve diplo-

mats needed coats.' "The incident was closed."

Enforcement of the game laws and the preservation of game are always live topics when a party of men interested in hunting | Reaching full growth, the caterpillars leave

up a paper from any one of the game districts and read a paragraph about like this: 'Mr. James Johnson, a sportsman widely known throughout the country, was at his father's plantation in Mississippi last week it of the larvae, however, suggested anand in company with his worthy sire killed other remedy, which has proven practical 100 ducks in two days.'

"I do not happen to know Mr. Johnson, but I deny that he is a sportsman. He strikes me as being what you newspaper boys occasionally refer to as 'a game hog." There is an utter absurdity in passing laws to protect game against men who like to hunt a little in the woods and along the streams when a couple of men can go-outand kill a lot of ducks, such as these two are reported to have done. "It is impossible for them to eat such

lot of game, and from what I know of the section of Mississippi whence the report emanates there are not people enough there to make way with such a string before the birds spoil. I suppose Mr. Johnson would object to being called a pot hunter and a merciless destroyer of game simply for the sport of killing, but that is the way it looks up here in the capital of the nation.

"It is such people, who call themselves 'sportsmen,' who need to be suppressed. Think of a flock of ducks being exterminated by a couple of men who have no use for the birds and no possible way of disposing of them away down there in the wilds of Mississippi. The southern papers every week contain accounts of many such incidents as the one I have mentioned. Yet we wonder why there is a scarcity of ducks, and howl for legislation to protect them.

"Mississippi would not enforce a good game law if she had it. Like Florida, Mississippi has always been a slaughter pen for visitors and feather hunters, and there are correspondent. "He just can't find the foot not many more egrets, herons or alligators there now than there are in Central Park, in New York city, just because the woods are er foot rails are usually at the bottom of full of hunters of the James Johnson type."

Cheap Lodging Houses for Poor.

Practical steps have been taken to provide cheap lodging houses for the poor in Italy. United States Consul Brush at Milan, who has made an official report on tel," opened in Milan in 1901, has proved a great boon to that class of people whose means impel them to take advantage of the very low prices charged for meals and washing and sleeping accommodation. The co-operative society (a benevolent institution) which was responsible for that hotel has now erected in Milan a dormitory which provides lodging for the night at the low charge of four cents, which may be reduced later to three cents. This has accommodations for 360 persons. The building is steam heated and is provided with electric light and ample washing arrangements, both for personal ablutions and for laundry work. The cost of erection, exclusive of land and furnishing, was \$38,600.

The consul says that another benevolent society, with a purely charitable program, is studying and working for the erection of night refuges, in which, without any charge whatever, people without a home can find shelter and warmth for the night. will send the things, I remain very truly The first of such refuges was opened last year, and the benefits conferred on the miserable poor are so apparent, the consul says, that it is hoped that other refuges will soon be opened.

Susceptible England.

We possess the largest empire there has ever been and are enormously rich, yet our | From the Garden Magazine. "society" are being rapidly transformed by the influence of other nations, though we should be the dominating race. Moreover, most of the great discoveries, inventions

A NATURAL INFERENCE.

WEB WORM IS AT WORK

HAS BEGUN PREYING UPON THE CITY'S SHADE TREES.

Description of the Insect Pests-How Citizens Can Aid Authorities in Work of Protection.

The insect pests that annually prey upon the shade trees of the national capital are beginning to make their appearance in formidable numbers, and before very long the traces of their depredations will be in evidence all over the city. There is a grain of consolation, however, in the fact that trees of Washington-which constitute one of the city's chief claims to beauty-only one, the fall web worm, appears to have made a good start. The other two, the imported leaf beetle and the white marked tussock moth, are apparently having an off year, although it is yet a trifle early to predict with any degree of certainty that they will not later join the ranks of the invaders.

The fall web worm is in itself, however,

a serious menace to the city's plant life.

clated with the tussock moth in the destruction of the shade trees of Washington during the summer of 1895. During that year the web worm was more numerous in Washington than it had been previously since 1886: It is a typical American spe-Georgia and from Montana to Texas, and the leaves of which the web worm feeds. . In the District of Columbia and north to New York city there are two generations annually of this pest, as in the case with the even more destructive tusscek moth. In most northern localities, where it is "I have the very great honor to humbly single-broaded, it loses its place as a specifier your excellency the services of my cles of great importance. The term "fall" applied to the web worm is in the nature of a misnomer, as the insect, in Washington at least, makes its appearance in the spring and continues its active and destructive work throughout the summer.

Hibernates Within a Cocoon.

The web worm hibernates as a pupa within a cocoon attached to the trunk of its food plant or to tree boxes, neighborstones at the surface of the ground. The moth may be either pure white or spotted with black. It flies at night and deposits cluster of 400 or 500 eggs upon either the upper or the under surface of the leaf. These caterpillars feed gregariously, and each colony spins a web which may eventually include all the leaves of a good-sized limb, thus giving the insect its name. nake their appearance in force in August Because of the fact that the adult female web-worm is an active flier, only two of the remedies used against the tussock moth caterpillars-spraying with arsenical poisons and collecting the cocoons-can be used against this pest. The gregarious haband efficient if thoroughly carried out. This is the destruction of the webs and the contained larvae, either by cutting off the twigs which carry them and burning immediately, or by burning the webs without

pruning If this work be done properly and against the early summer generation the pruning method is unnecessary and inadvisable. By the use of a proper torch the webs and the caterpillars which they contain can be burned off at nightfall without necessarily destroying the life of the twigs, and a sec ond crop of leaves will be put out a little later, so that the tree does not remain dis-

figured for any appreciable length of time. How to Destroy the Pests. A bundle of rags wired to the end of a pole and saturated with kerosene makes a good torch for the purpose, or a porous brick wired to a pole and saturated with kerosene has been found to answer the purpose even better. Private persons should find this remedy sufficient, but city authorities can usually do better with the arsenical spray. Collecting the cocoons in winter may be carried on simultaneously with the

collection of the egg masses of the white marked tussock moth. Almost every resident of Washington has seen trees with bandages of cotton around their trunks, about six feet from the ground, and probably most of them have believed this to be a simple and safe remedy against the attacks of the insect pests. As a matter of fact, however, it is declared to be of no value at all in protecting the city's shade trees against the depredations of the annual insect visitors. It is a protection against certain species of insects which flourish abroad, but against the white-marked tussock moth, the fall webworm and the elm leaf-beetle it does not serve, as the three varities named are all flying insects, and do not depend upon a journey up the tree trunks as a means of

reaching the foliage and their food. Citizens Can Aid Authorities Greatly. As a matter of fact, leaving aside all community methods of protection, a great deal can be done by the citizens of Washington in protecting the trees of the city from at least partial destruction. The average city householder seldom has more than half a dozen shade trees in front of his grounds, and it would be a matter of comparatively little expense and trouble for any family to keep these trees in fair condition. It needs only a little intelligent work at

the proper time. It means the burning of the webs of the fall web worm in May and June; it means the destruction of the larvae of the elm leaf-beetle about the base of elm trees in late June and July; it means the picking off and destruction of the eggs of the tussock moth and the bags of the bag worm in winter, and equally simple operations for other insects should they become especially

injurious. The experts of the Agricultural Department believe that what a man will do for the shade and ornamental trees in his own garden he should be willing to do for the shade trees ten feet in front of his own

Japanese Irises

Little wonder that the iris, so boldly landed almost at the door of his office.

decorative in outline and bearing a flower But even this is not all that this tunne decorative in outline and bearing a flower of exquisite coloring so marveously formed, should make its strongest appeal to the artistic Japanese. From these foremost no longer necessary to transfer passengers gardeners of the world has come a strain of from one to the other, circuitously. Moreirises that neither orchids nor lilles can rival in beauty of form, texture, coloring. markings and general effectiveness. In the Mikado's garden, under ideal cultural conditions-that is to say, in rich, warm, sunny alluvial land-the blossoms will measure from nine to twelve inches across their flat petals. Around the shores of those miniature lakes and streams in which the Jersey City, speedily finds herself at 9th Japanese gardener, however humble, destreet and 4th avenue, in New York, and lights, the irises are no less lovely because there transfers to a New York subway train a small garden demands that they be of lesser size. Every one appreciates the iris in Japan. Therefore, on the most costly cloisonne and ceramic, as well as on "many a vase and jar, on many a screen and fan, whose decorator may receive only an eighth of a cent or his sketchy painting, this flower, imperial and democratic, is the most familiar. For the artist at least its value is double that of the national chrysanthemum.

Liquor Drinking in Great Britain. United States Consul Knabenshul at Belfast reports to the Department of Commerce and Labor that the sum spent for intoxicating liquors in Great Britain and It eland in the calendar year 1904 was \$317.- piece of work, which is being pushed for-000,000 in round numbers. That is a decrease from the total of 1903. In fact, for several years, the national drink bill has been decreasing. The average per capita expenditure for drink in 1904 was \$20.50 for England, \$15.57 for Scotland and \$15.08 for Ireland. In Belfast, with an estimated population of 358,608, the total expenditure was \$5,495,000 for drink. That is almost equal to the total taxable valuation of the city, which for the year ending March 30, 1904, was \$6,129,610.

THE WORLD'S GREATEST INTER-URBAN TUNNELS



Written for The Star. Wonderful as is the New York subway from the engineering standpoint, and as the solution of the municipal problem of rapid transit, the effect it produces is wholly local. This is naturally so; it was planned and built solely for the purpose of giving easy and quick access from one part of the greater city to all other parts. But there is now in course of construction in and around New York an underground rapid transit system that, when in operation, will produce not only a vital effect on the

to a very large extent.

Briefly, this system, as planned to date, consists of four tunnels in pairs under the Hudson river, connecting the New Jersey. shore with the Island of Manhattan at two points; two parallel tubes running from two of the river tubes under the island, through five metropolitan shopping districts; two tubes along the New Jersey water front connecting the four river tubes and all the trunk line terminals, except one, on the Jersey shore, and a spur running from one pair of the river tunnels back from the Jersey water front to a point where connection can be conveniently made with the intricate network of trolley lines spread over the streets of and interlocking Jersey City, Hoboken, Newark, the Oranges and other teeming suburban centers within a twentyfive-mile radius of New York's city hall. These cities and towns combined have a population of 2,160,000, which is greater by 100,000 than the population in 1875 of New York city, and all the towns and cities. Brooklyn included, within its sphere of in-

Meaning of the Tunnels.

Now, see what this McAdoo system of * * * * *

Every one knows the difference that a letter or a punctuation mark will some letter o front points which this wonderful system

> Many of these people are commuters; daily they cross the river at least twice, to and from business. A train load of commuters arrives at the Pennsylvania railroad terminal in Jersey City during the morning rush hours, let us say. At present the commuters take a ferry boat, run at best on a ten-minute headway. They arrive at the New York slip in eight minutes, if the boat has not been impeded by ice, delayed by fog and interfered with and imperilled by car floats, sailing craft, tugs and steamers. They dodge across and along crowded streets for several blocks to subway, surface lines or the nearest elevated roads, and, either by walking a considerable dis tance or by transferring from one line to another, at last reach their offices. In like manner out-of-town visitors to the metropolis from Chicago, San Francisco, Crossville and Hanson's Corners must make their way laboriously to the shopping, wholesale hotel, theatrical and residential centers of

> But now the McAdoo system of underriver tunnels is in operation. A suburban steam into the Pennsylvania terminal at the same time during the two morning rush hours. The station is connected with the tunnel system-down into it pour commuters and through travelers. They step into trains of steel cars, running on from one to two minutes' headway, and in three minutes are whirled through a circular, cast iron, concrete-lined tube, fifteen feet two inches in diameter, brilliantly lighted, splendidly ventilated and equipped with all the safety devices known to electrical engineering. Once in the commodious terminal of the system on the New York side, in Church street between Cortlandt and Dey streets, they either step out of it, to find the "L" overhead; or, by walking from the terminal along a connecting footpath, under Dey street, they are in the Fulton street station of the New York subway, with its express and local trains ready to carry them either uptown to the Bronx, or downtown to the Battery, and thence under the East river to the outlying districts of

Brooklyn itself. Conveniences of New System.

But this is not all. On the through train there arrives from a business trip beyond the Mississippi a New York manufacturer who lives in Cranford, a suburb on the line of the Central railroad of New Jersey, the railroad terminals opposite New York He has written his wife that he will meet her at the Central railroad's station. Under the old system he would have been compelled first to go to New York by ferry and then to take another ferry line to the place of meeting. Now he steps into the tunnel at the Pennsylvania terminal, in less than five minutes steps out of it into the Central railroad terminal, and there

This New Yorker's office is in one of the skyscrapers in the 33d street shopping, hotel and theatrical district; his wife has plauned to continue uptown in New York after meeting him. They enter the tunnel from the Central railroad's terminal, are whiried northward along the Jersey waterfront un der the Pennsylvania station, under the Erie station a half mile to the north, and in another minute they are traveling under the iver, a mile and more to the north of the pair of downtown river tunnels. When they reach the 9th street station in Manhettan the wife leaves the car to wait for train going east to 4th avenue and 9th street, where she can step into the New York subway and proceed uptown to her daughter's Harlem flat to tell her of her father's safe arrival home. The husband is whirled at express train speed under 6th avenue's shopping centers to 33d street, and system does. There is direct communicaover, all the trolley lines of the corporation

tion between all the railroad terminals, ex- Christopher streets, New York. It was not cept one; ferry boats and surface lines are controlling the surface transportation of that part of New Jersey tributary to New York feed into the upper pair of Hudson river tunnels at a central point in Jersey City. Therefore, that woman living in Hoboken who wishes to go to the Grand Central station in New York takes a trolley car going past her door, transfers to the tunnel at 15th and Henderson streets in for the Grand Central station. Today it is impossible to make this trip without waiting from five to twenty minutes for a ferry boat, spending all the way from eight to fifteen minutes on a boat, according to the route, and walking a considerable distance between car lines in New York. New York linked to the mainland by en-

during circular bands of iron and concretea river wiped out-the time of travel between metropolis and mainland cut down one-half-new possibilities of suburban life opened up to hundreds of thousands of cramped city dwellers!

The Man Back of the Tunnels. William G. McAdoo is the name of the

min who is responsible for this gigantic wird so quietly and with such consummate engineering skill that not even the cobble stines of Morton and Greenwich streets in New York, under which two tubes are be ing bored, have been disturbed. Engineers will grasp how really remarkable this feat is when it is added that at Morton and Greenwich streets is the sharpest tunnel curve driven to date by a hydraulic shield under compressed air—a curve of 150 feet

metropolis and its populous New Jersey environs, but on the entire country, as well, curve of 150 Poot Radius in the 6th Ave Exter man. He is tall and spare. He has a thin, I though it be below the waters of the Hudclean shaven face. His eyes are blue and son river. deep set. His voice betrays a soft southern Constructing the Tunnels. accent, imperceptible almost, yet one that keeps the listener attentive to hear how he will pronounce this or that particular word. He is a lawyer by profession. He was practicing law in Chattanooga, Tenn., in 1802, when he determined to move to New York. Before coming to the metropolis he

there and in Knoxville. A great deal of his practice in New York came to be of similar character. Naturally, matters affecting transportation, whether railroad or municipal, appealed particularly to him and attracted a great deal of attention from him. At the same time as a member of the banking and brokerage firm of Pemberton & Mc-Adoo, he devoted not a little of his time to was a member of this firm; and from 1890 to 1902 his law partner in the firm of Mc-

TUNNEL SYSTEM INDICATED BY THE BLACK LINES.

McAdoo, but not a relative. Of course, Mr. McAdoo, student that he necessarily had to be of New York's rapid transit situation, did not fong remain in ignorance of the fact that when he was ten years old D. C. Haskin, an engineer of ability and reputation, organized the Hudson Tunnel Railroad Company, with a capital of \$10,000,000. That was in 1873; and the plan was to build a tunnel "from the foot of 15th street, in Jersey City, under the Hudson, and thence to the New York bulkhead line at the foot of Morton street, a distance of 5,400 feet."

Adoo & McAdoo was the present police

commissioner of New York city, William

An Old Tunnel Plan.

From this point the tunnel was to be continued to the south side of Washington Square, where several blocks of land were to be acquired and a large terminal station built. The tunnel was to be of solid masonry three feet in thickness. It was to be circular in form, with a height of twenty-six and a width of twenty-four feet, painted white and lighted by gas. Through it from a connecting entrance near the foot of Bergen Hill, Jersey City, five of the big railroads terminating on the Jersey shore of the Hudson were to run their trains into Manhattan. The trains were to be hauled by specially constructed engines, which would have sufficient power to overcome the tunnel grades and would consume their own smoke and steam, thus keeping the air fresh in the tunnel. All told, this plan called for 12,000 feet of tunnel and ap-

In November of 1874 a shaft was sunk in Jersey City to a distance of twenty feet; then the work was enjoined by the Delaware, Lackawanna and Western Railroad Company. It was not until five years later that the railroad was finally put to rout by court decisions and the work begun afresh. But the tunnel builders were not through with trouble. In July of the following year, when everything had been going splendidly for some time under Mr. Haskin's system of applying compressed air without the use of a shield to hold up the earth, a fissure was struck, the air escaped, letting in the river, the door of the air-lock became jammed, twenty men were drowned in the rush of water and silt, and the tunnel was

Mr. Haskin was undaunted. The tunnel was cleaned out, and for two years the work progressed. Then the money gave out, and Mr. Haskin and his associates, having built over 1,500 feet of the original tunnel and nearly 600 feet of a parallel bore, thirty feet to the south, were reluctantly compelled to recognize defeat. For eight years the tunnels remained filled with water. Then the company was

reorganized, and the famous English contracting firm of S. Pearson & Co. undertook to complete the tubes. Two thousand feet of iron-lined tunnel was built by them; then, in 1892, work again came to an endno more money.

That was the year when Mr. McAdoo arrived in New York. Perhaps the seeds of his plan to bore under the Hudson were sown then. At any rate, long before he got possession of the franchises of this abandoned enterprise, and despite its tragic history, extending over a period of twentynine years, had secured the necessary capital, he had recognized the urgent need of doing something to improve traffic conditions between the metropolis and New Jer-

McAdoo's Original Plan.

Mr. McAdoo's first plan was simply to complete what is known as the north tunnel of the original scheme, put in two narrow gauge tracks and run small cars back and forth between 15th and Henderson streets, Jersey City, and Greenwich and long, however, before he decided to complete the south tunnel, thus permitting of the operation of a single standard gauge track in each tunnel, making the liability of accident practically nil and enormously increasing the carrying capacity. These tunnels will now be extended up 6th avenue to 83d street, and from 9th street and

tor place. Shortly before the work of moving the shield was begun in the north tunnel, on October 22, 1902, Mr. McAdoo, who had also been thinking hard about the congested condition of traffic at Cortlandt street, where two ferry lines discharge passengers into this busy and overcrowded thoroughfare, took up the question of driving two tubes under the river to connect the metropolis in this neighborhood with the Pennsylvania railroad terminus in Jersey City. Then came the idea of connecting the trunk line terminals, and early last year he worked out the scheme of con-necting the original tunnels with the great metropolitan shopping, hotel and theatrical district at 33d street and the New York subway at 9th street and 4th avenue.

required great force, courage and nerve to push it successfully in its formative days, It is a piece of work still requiring all of those enviable attributes, and in the opin-ion of the man primarily back of it it is a piece of work which will solve the rapid transit problem for the sections of the city and suburban country it pierces and draws on for many generations to come.

The traveling and commuting millions now dependent upon slow, inconvenient and unsatisfactory ferryboats between the metropolis and New Jersey certainly owe a debt of gratitude to Mr. McAdoo for the

the machine in the middle for ereching the rings

system to the men who will equip it for operation about sixteen miles of tube will have been bored, or what amounts to two parallel lines of eight miles each. At preshad been attorney for railroad interests ent what is known for purposes of identification as the north tunnel is bored; the south tunnel is within a thousand feet of the New York bulkhead. Active work will soon be begun on the 6th avenue extension of the tubes, and the shaft is sunk for and work will shortly begin on the down town river tunnels. All of the bores except the north tunnel will be of fifteen feet two technically known as triangulation. Then, inches internal diameter; the north tunnel the mainsail of the cup defender Reli-Mr. Charles M. Jacobs is the engineer in

charge. He has employed the shield method of construction from the start. In completing the north tunnel he used the shield left in it by the second company, greatly improving and strengthening the same and the marvelous part of it all to the lay-That Mr. Jacobs has built one tunnel without so much as a serious or protracted delay, and is going ahead building others the flooded heading had been blown clear with as little fuss, is proof sufficient of the and clean by means of compressed air, the ability he has brought to the work in hand. shield doors closed, and work begun again In December, 1902, Mr. Jacobs prepared the following statement of the method employed in the building of the tunnels; at the same time light is thrown on the character of the earth through which the river tunnels have been or are being driven: "The work is executed under pneumatic pressure. The soil in which the tunnel is built is a stiff, compact clay silt, forming the bed of the Hudson river. The shield used at the face and for the purpose of construction is a machine built up of boiler plates, strengthened with massive steel

partments. This shield forms a solid bulkhead across the face of the tunnel while construction is proceeding. The soil is excavated in front of the shield, and is brought into the tunnel through doors left in the diaphragm, by which name the bulkhead of the shield is known. These doors can be controlled from inside the tunnel, according to the material to be moved, and the men are able to work through the doors in advance of the shield whenever necessary. The shield is pushed forward by numbers of hydraulic jacks exerting enormous pressure, and in the shield at present installed, as well as in the new shields now in process of construction, the total power available for pushing the shield is 2,000

Working the Shield.

"As the shield is pushed forward and the

material is excavated, cast-iron lining plates are erected inside the tunnel and within the shelter of the tail of the shield. so that at no time is the material exposed, and there is, therefore, at no time any serious danger to life or to the work itself during the process of construction. The power acting on a machine independent of but attached to the shield, which machine permits of placing each plate exactly in the designated position in the finished tunnel; and these plates are securely bolted up and the joints calked and secured so as to make an absolutely water-tight lining of fron for the tunnel. "In order to prevent any possible influx of water air pressure is carried inside the

tunnel and work is executed under this pressure. Under ordinary conditions the air pressure carried in tunnels being constructed by this company is very light, and such as not to hurt in any way any employe engaged in the work. At the same time, however, in case any emergency should arise it is immediately possible to increase this pressure in order to keep the work absolutely safe. The way in which air pressure is carried is by the insertion, within the completed tunnel and within considerable distance of the wall in which airlocks are constructed. "These airlocks form chambers, with doors at each end, both doors operating in the same direction—that is to say, inward to the tunnel-and by this means the pressure may be equalized at any time within the airlock chamber, either with the pressure carried inside the tunnel or the atmospheric pressure outside. access to and from the outer atmosphere

preciable. Wonderful New Machinery.

"In the design of the machinery for car-

rying out the remaining work, which machinery is at present under contract, all the most modern devices known in tunnel building are being adopted, and it is 6th avenue eastward to 4th avenue and As- anticipated that double the quantity of finished tunnel can be constructed each day than has ever been done heretofore. New shields are being designed especially suitable for the requirements of tunnel | end, toward the top of the car, a robin building in the soil found under the Hudson river. The present shields and the new shields will be operated by hydraulic power under a maximum pressure as high as 5,000 pounds to the square inch, while pneumatic pressure is used for drilling rock in the face and for driving the haulage engines in the tunnel, and electric power is being used for lighting the whole works. "In the new portion of the tunnel constructed by this company in the last two months work has been carried on under

the most difficult condition known in tunnel building with absolute success and tree. It was carefully tied fast to the tree a week. It is a project that, by reason of its great scope and the history back of the of the turnel in solid rock formation, original undertaking from which it sprang, while the upper part of the turnel is in watch of her flock. It was calcularly theu last to the tree with strings, the mother bird watching the proceedings from a nearby limb. As on as fluished she resumed the faithful watch of her flock. while the upper part of the tunnel is in clay silt. The rock has been drilled and blasted in advance of the shield's progress with satisfactory results and complete success, and everything points to rapid construction and to an early com-pletion of the entire undertaking." In the north tunnel, where Mr. Jacobs worked with the shield that came with the purchase of the old company's fran-

chises and good will, eighteen feet advance a day was the best that could be done in

rate of rock removal varies from three to

Thrilling Experiences of Workers.

When the second company which tackled the tunnels abandoned the work the shield was close to a ledge of rock, which was encountered soon after the McAdoo company took hold. The north tunnel is eighteen feet in diameter internally, and at no point did the ledge project above the tunnel; it was from one to sixteen feet in height. This presented a unique engineering difficulty. Only silt overhead-and dynamiting necessary. And where the ledge was thickest the silt was thinnest-only about twelve feet-and the river deepest, some sixty-five feet. If the ledge had only cropped out where the silt covering was two or three times as thick-but at its weakest spot. It was fortunate for the tunnelers that the one and two foot outcropping appeared first. They gained a lot of valuable experience blasting this away, so that when the most formidable outcropping was reached they intrepidly but carefully set about drilling ahead of the shield and dynamiting delicately, so as not to awaken the river demon overhead. They knew that there was only a few feet of treacherous silt between them and a whole river of water. They knew that a grain too much of explosive would let that river of water in upon them. They knew all this, yet they worked on with steady harids and cool heads and one day, after three months of nerve-wracking toil, they struck sllt again-and there had been no accident, truly a feat that seems almost superhuman to the lay mind. Of course, there have been accidents to the men working in the tunnel, but not a life has been lost since Mr. McAdoo's company took possession. At most, fingers and legs have been injured, some employes have been treated in the company's compressed air hospital for the "bends," but even such cases, peculiar to tunneling, have been comparatively few.

Examined by a Surgeon.

The company's surgeon always examines the employes prior to work, and lets none go into the heading who is not in prime condition. Engineering skill, too, has had a lot to do with this clean record; and this same skill has overcome setbacks that would have appeared well-nigh insuperable twenty years ago, or at least delayed the work for weeks and months.

Such an accident was that which occurred in the south tunnel near the New Jersey shore when the foreman regligently left the shield doors open, the river bed gave way, and the tunnel was flooded back to the air lock. Between those open doors and the point where the steel wall of the air lock stood there was speedily 900 feet When the tunnelers finally turn over the of mushy substance fifteen feet and two inches in diameter. How were those doors ever to be shut so that the flooded portion of the tunnel could be cleared? Somewhere over the surface of the tidetossed Hudson was the point where the shield stood far below, and the leak in the river bottom had occurred. But where?

The engineer knew from his daily reports of the work that the shield had cut its way to a certain point, but to locate a given spot on an expanse of water is a far different matter from locating such a spot over the surface of terra firma. Still, the engineer did it from the shore, by what is ance, having been bought expressly for the purpose, was taken to the designated spot, spread over it, evenly loaded with bags filled with clay, and, allowances having been made for tide and current, the sail was allowed to sink with its burdenman is that it sank over the hole, plugged it up effectively, and in a few days' time as if nothing extraordinary had ever happened.

When the Tunnels Are Completed.

The north tunnel under the Hudson was March 11, 1904. At that time Mr. McAdoo conducted a party through the bore, and was himself the first man in the world's history to cross under the river and into New York. The south tunnel is rapidly webs, both vertically and horizontally, and | nearing completion. At the present rate divided up into a number of separate com- of progress it is conservatively estimated that all the tunnels will be completed

and in operation in 1908. The equipment will be of the latest and most approved pattern. The cars will be all steel, on the order of the steel cars in service in the New York subway. Every safety device known to electrical engineers will be installed, in order to insure the public immunity from accident. The bores throughout will be made as light as day by the employment of electricity, and if the suction of the trains themselves does not give sufficient ventilation an artificial system of ventilation will be installed to keep the air as fresh as that above ground. But the experts are confident that with trains going only one way in the tubes artificial ventilation will be not necessary to

keep the tunnels sweet and fresh. The first train to go over the entire Mc-Adoo tunnel system is about ready to start. Its four handsomely finished cars are comfortably filled with the officers, directors and head builders of the tunnels and a few invited guests. The guards give the bells to start. The motorman throws the lever around, the train gathers speed even before the platform of the terminal in Hoboken is left behind, and, in fancy, we hear Mr. McAdoo saying to his companions: "Now, gentlemen, we shall behold what dream man has made real after thirty-five years at a cost of untold energy, numerous

WATER PURIFYING APPARATUS.

bitter disappointments and millions of dol-

Electric Current Utilized for Removing Deleterious Matter.

Electricians have tried in recent years to simplify the means of electric ozone development for purifying water, with a view to having an apparatus that could be put in any dwelling place and by utilizing the current of the common electric light wires purify every glass of drinking water. United States Consul General Guenther at Frankfort, reports that Mr. Otto, a French enrear of the shield, of a solid bulkhead gineer, has made an apparatus that successfully performs that service.

"This apparatus," says the consul general, "is of very simple construction and takes up little space. It consists principally of a small, closed box, the metal cover of which is made conductory with the bottom. In the box is an ozone developer, an interrupter and a tln tube. Through the latter the ozone, which first has to pass through a cotton stopper to and the face of the tunnel work. In this free it from dust and germs contained in work the airlocks are arranged in dupli- the air, is conducted into the water and cate, forming two stages of air pressure, mixed therewith. If much ozone has been and are located about 1,500 feet apart, absorbed the water becomes phosphoreswhich permits a very easy movement into | cent in the dark. The most important part and from the tunnel and makes the ef- of the apparatus is the "mixer," action of fect of air pressure upon employes inap- | which can be interrupted at will. The apparatus is capable of purifying about sixty gallons of water an hour, and the cost per hour is about the same as that of an ordinary electric incandescent light."

> Faithful Mother Bird. From the Youngstown (Ohio) Vindicator.

Three weeks ago a freight car came into the yards at Chillicothe, Ohio, and the railroad men discovered on the footrest through which the brake protrudes at the had built its nest. In the nest was one egg. The car had made a continuous trip from Michigan and stood here a day or so and was sent to Ripley, Ohio. Upon its return here two eggs were in the nest. It was again sent to that place and returned with three eggs. In this time the mother bird had hatched the eggs out, ever following the car in its meanderings. The railroad men had kept a strict watch upon the nest and saw that nobody molested it. Orders came to send the car to Michigan and the men held a consultation and it was decided to remove the nest to a nearby watch of her flock. Investigation has proved that the mother bird traveled hundreds of miles in following the nest from Michigan to this part of the country.

Fooling Him. From the Philadelphia Press.

Mrs. Ascum-Have you bought your husband's birthday present yet? Mrs. Newliwed-Yes, and I think it was real clever of me, too. I bought a big clear for ten cents.

Mrs. Ascum—That looks rather cheap.
Mrs. Newflwed—Yes, but walt. I found a
price tag marked \$2.50 and I pasted that

afit, and in rock from twenty inches—the width of the ring of the cast-iron lining—to five feet. Now, by means of the new machinery which was being built when he made this statement, as high as thirty feet of silt has been displaced in a day and the "Oh, mamma, I know what you mean by sound asleep now. Just listen to papa!"