peculiar to hot climates or that are wont to ravage camps with unusual virulence; and these too often are the result of improper clothing and the burdens of equipment, supplemented, perhaps, by duties required that could be more reasonably and ably performed by natives. In this connection it may not be amiss to call attention to an incident in the French campaign in Madagascar, an island bearing a wonderful similitude to Cuba in that it possesses topographically the same general features, has like peculiarities of climate, and south of the equator has relatively the same latitudes and isothermals as has Cuba to the north of the line.

In 1895, the 200th Regiment Infantry of the Line, 1,200 strong, left Paris for Madagascar. It was composed of young soldiers, practically of the same material physically and socially as our own volunteers. "Robust, agile, and merry, they appeared able not only to defy the efforts of any human foe, but also to remain invulnerable to the onslaughts of a more potent enemy—the noxious emanations of marsh lands and pools." After an uneventful voyage and unopposed landing, this regiment was set to building a highway, whereby artillery and supplies might be transported to the table lands of the interior. In spite of rigidly enforced sanitary measures, suitable food, and appropriate clothing and equipment, the men died like sheep; heat-apoplexy, typhoid, dysentery, malarial fevers, diarrhea, each claimed its quota of victims. Eighteen months after leaving France, this regiment returned—it had not participated in a single skirmish—a mere handful of two hundred and odd gaunt, fleshless, yellow "convalescents," several of whom were to follow the thousand of their comrades that had "gone before." Why native laborers were not employed, which—as is also true of Cuba—could be had in abundance, is one of the mysteries of military administration.

Much has been said about acclimatization, immunes, etc., but it must be remembered no one is immune or acclimatized in the face of exhausting labor and uncalled for hardships, or when camped in the midst of swamps, surrounded by camp effluvia and decaying and fermenting forms of luxurious tropical vegetation. Add to the foregoing terrific heat, improper head covering, deluging cold rains, and oftentimes unfit food, and one has a fair summing up of the conditions under which the army is operating in Cuba.

It is to be sincerely hoped that, with the fall of Santiago, the conditions surrounding the army may be so modified that the loss from fevers and exposure may be reduced to a minimum.

THE FALL OF SANTIAGO.

The capitulation of the city of Santiago de Cuba and its defenses, on the 14th instant, is a cause for general congratulation. Not only has the campaign in the province of this name been exceedingly brief, considering the strength of the fortifications and the topographical features of the country, but the victory has been obtained at an astonishingly small expense of life and blood. In less than a fortnight Cervera's fleet was destroyed, and the American ensign raised over Morro Castle and its outlying and contiguous fortifications—surely, glory sufficient for a campaign of scarce thirty days, made by a mere handful of troops that at no time exceeded 24,000 in number. Gen. Shafter has certainly permitted no useless delays, but has pushed his military operations with surprising vigor. Even the most sanguine, possessed of any appreciation of the difficulties to be encountered, dared not predict so speedy and glorious a result. The terms of capitulation are, moreover, creditable to the military genius of the nation and its humanity.

Gen. Toral and his entire command are to be sent home to Spain at the expense of our government—a procedure that cannot but commend itself to all. May those who fall into our hands by the future fortunes of war ever receive equal consideration, in degree if not in kind, remembering individuals are not responsible for the shortcomings of national administration, and that loyalty is at all times an honor and virtue.

The greater part of the province of Santiago, comprising the easternmost portion of Cuba, is now, actually or nominally, under the United States flag and American rule. Thus is established an excellent base for future military operations, whether they are extended toward Havana or carried across the Caribbean Sea to Puerto Rico.

Many there are who deem the capitulation of Santiago heralds the dawn of peace. This is devoutly to be hoped for, yet is exceedingly improbable. The terms Spain is now willing to accept and those the United States can offer are separated by a wide gulf. Yet the American people can afford to be generous, and an exorbitant indemnity, it is trusted, will not mar any negotiations. The Spanish people and nation have had their own troubles during many a decade. Misfortune has followed misfortune, and it is not becoming to us as a nation to unnecessarily add to burdens that are already extreme. True, the Spanish nation has no real conception of its losses or the utter lack of available resources, and there has ever been the latent hope of foreign intervention, which, after all, appears to be carefully fostered in certain quarters, and for some political purpose that can only be surmised.

TWO INTERESTING DECISIONS.

Judge Lacombe has just handed down a decision in the infringement suit brought by the Welsbach Light Company, under United States letters patent to Rawson, No. 407,963, dated July 30, 1889, against the Apollo Incandescent Gas Light Company et al., in the United States Circuit Court for the Southern District of New York, denying a motion made by the complainant for a preliminary injunction. This patent is for the process of strengthening the mantles, used in the Welsbach and other lamps of that type, to protect them against breakage in transportation and handling, by coating the completed mantle with "paraffin or other suitable material, which is burned off when the mantles are erected." In an action brought by the Welsbach Company against the Sunlight Inc. Gas Lamp Company (83 Off. Gaz., 595), Judge Townsend sustained the patent, giving it a broad construction and holding that a solution of collodion and castor oil was covered by the claim for "paraffin or other suitable material." On the strength of Judge Townsend's decision, several preliminary injunctions have been granted by the courts restraining various manufacturers from infringing the patent. In this suit against the Apollo Company, it was contended that the Rawson patent was void because the alleged invention had been patented in France by Rawson on November 2, 1887, and that this French patent had lapsed because of non-payment of annuities. This point was not passed upon by Judge Townsend, and Judge Lacombe held that the question as to whether or not the lapsing of a foreign patent, subsequent to the application but before the issue of a United States patent, invalidated the latter, was so much in doubt that it should not be decided upon preliminary motion, but upon final hearing.

In the case Kellar vs. Strauss, also an infringement suit, the complainant annexed to the bill of complaint written interrogatories requiring the defendants to state, under oath, how many of the alleged infringing devices (one of which was annexed to the bill) they had made, used, or sold and how many they had on hand for sale. The defendants in their answer refused to reply to either interrogatory and the complainant excepted, insisting, upon the argument, that upon the authority of National Hollow Brake Beam Company vs. Interchangeable Brake Beam Company (83 Fed. Rep. 26), the defendants must be compelled to answer the interrogatories; but Judge Lacombe declined to follow the decision of Judge Adams in that case and overruled the complainants' exceptions, holding that the complainant was not entitled to know how many of the alleged infringing devices had been made or sold until the validity of his patent and his right to an accounting had been established at final hearing.

RESPONSIBILITY OF STEAMSHIP COMPANIES IN MARINE DISASTERS.

BY DR. C. E. DE M. SAJOUS.

The particularly distressing circumstances attending the loss of the "Bourgogne," and the suddenness with which she entombed hundreds of unfortunate passengers, recalls the following statement made nearly thirty years ago by the president of the British Naval Architects: "The passengers who pass to and fro are not judges of the question, they can take no precaution for their safety; it is to the skill and science of those who build these ships that the passenger trusts, and to the care which the legislature and the government are bound to take of their fellow subjects." An unbiased critic can but concede that the strides in naval architecture and engineering during the last thirty years are entitled to the highest recognition. In speed and comfort the high-class passenger ships of our day are marvels of ingenuity; and if human intellect required evidence of its greatness, none stronger could be adduced than that afforded by one of those imposing masses of steel, representing combinations whose description alone would fill a large volume. But can the same encomium be bestowed upon the life-saving means of these very ships? Have the improvements in their construction included correspondingly valuable modifications with a view to saving the lives of their passengers? Have the appliances, such as lifeboats, life-rafts, life-preservers, etc., kept pace with those calculated to increase power, carrying capacity, and other purely commercial advantages? Surely inventors have done their share, and the Patent Office contains a multitude of models of appliances of value. But have the companies availed themselves of these? Have they devoted one-tenth of the energy in this direction that they have to the saving of—coal? In the name of the victims, their parents, their widows, their children, and their friends, I ask: Is everything that *could* be done by companies *being* done to prevent disasters such as that of the "Bourgogne"?—a mere repetition of that of the "Elbe" in 1895.

But little knowledge, but little research, but little observation, are required to warrant the conclusion that things about a passenger ship, having life in view, are not much farther advanced now than they were during the earlier years of steam navigation. The old davits with tackle, the so-called ship's lifeboats, the main appliances in case of accident, are practically the same as they were in 1837, when the "Great Western" made her maiden trip across the Atlantic, while bulkheads were a prominent feature in the construction of the old "Great Eastern." Apart from the indirect protection afforded by increased size, what is there to prove that modern genius has been utilized in the interest of life as well as it has in every other direction?

To judge from results, collision bulkheads have rendered valuable service, whether the object struck was a vessel or an iceberg, i. e., under special circumstances. But a review of the collisions of the last thirty years tends to prove that vessels receiving blows, and therefore depending on the intervening bulkheads, sink faster than wooden vessels did. Bulkheads may be at fault, but other reasons are also given by naval authors. Sir Nathaniel Barnaby, K.C.B., late Director of Naval Construction, Whitehall, for instance, says:

"The fact is that the great majority of ocean-going steamships are not divided into water-tight compartments in any efficient manner, and many losses in collision, grounding and swamping are due to this. Although steamships have some bulkheads, and some have many bulkheads, they are as a rule distributed in such a way, or are so stopped below the water level, that for flotation purposes after perforation those lying between the foremost collision bulkhead, through which the screw-shaft passes, are practically useless."

If we add to this the facts that bulkheads are perforated for doors immediately above the level of the water line, that a column of water and increased weight cause listing and increased immersion, the rapidity with which the "Bourgogne" was submerged need not be wondered at.

As regards lifeboats, another eminent constructor says:

"The number of lifeboats usually provided is sufficient to hold all hands on trading vessels, but on the passenger steamers which cross the Atlantic there is not davit room for boats enough to seat the passengers and crew. Moreover, it often happens that only the boats on one side, or in one part of the ship, can be lowered."

This might be adduced as an excuse. Anyone who has traveled to and fro a few times can but notice the paucity of lifeboats, and the fact that the davit room is not all utilized. The examination of fifteen photographs, representing as many liners, showed an average of seven boats on each side; one ship only showing an interrupted line of ten large boats on each side. What does this average of fourteen boats to the ship represent? The fact that only those on the lee side can be used in rough weather reduces the total to seven; two must be considered as sacrificed, smashed or capsized during launching. Five are left, with a capacity of about one hundred and forty persons—less than the ship's crew. Lifeboats? If they are lifeboats, why do they fill and sink with such rapidity? What use are rafts and life-preservers in such calamities as that of the "Elbe" and the "Bourgogne"?

The crew of the "Elbe" as well as that of the "Bourgogne" have been severely criticised. A closer study of the causes of this departure from duty, however, tends to mitigate too harsh a judgment. The passengers embark, trusting that amply sufficient protection for their lives is provided; the crew know the contrary. While hope sustains the passenger until the last minute, death stares the ship's company in the face from the start. Is it a wonder that the instinct of self-preservation predominates among the rank and file of a crew mainly made up of landsmen, stewards, waiters, cooks, bakers, stokers, etc.? What is to be expected of such men when confusion reigns and impending death paralyzes their reasoning powers?

Bona fide seafaring men do their duty as a rule. As far as captains are concerned, there is not one commanding a passenger liner across the Atlantic in whom I would not place implicit trust, if courage and honor were the only factors needed to preserve life. In many minds, condemnation follows the captain of the "Bourgogne" to his watery grave. I knew him well, and no braver man ever walked a deck. Had this poor victim of duty had adequate appliances to save all, rewards would have been showered upon him as they were upon the captain of the steamship "Missouri," seven years ago, when he saved over a thousand passengers. Give those men the means; give their crews the chances that the average man has upon the battlefield—then judge with equity. If the crew of the "Bourgogne" is to be brought before a court, the responsibility of the company should not be forgotten, if justice is to prevail.

Indeed, it is time to realize that outside of the indirect influence of increased size and power, practically nothing is being done by steamship lines to improve the life-saving possibilities, and that increasing rate of speed and traffic are daily increasing the danger. The companies may do all in their power to mitigate the effect of such a murderous catastrophe as that of the "Bourgogne" upon the public mind: nothing can counteract truth, and the silent but crushing result is

there to contradict them. When they will recognize that safety is the primary element among the general public, and utilize intellect for life saving as freely as they do for coal saving, ocean travel will be doubled.

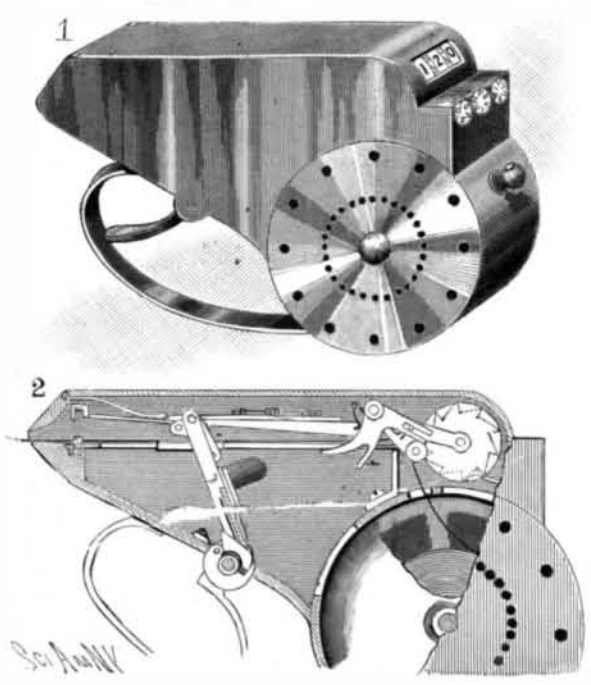
COMBINED TICKET HOLDER AND REGISTER.

We illustrate a ticket holder and ticket register recently patented which is designed to hold and deliver a large number of tickets, such as used on cars or in theaters or other places where a uniform fee is charged. The apparatus is designed to contain a continuous ticket strip and deliver a suitable length corresponding to the length of the ticket, the operative parts being improved in various particulars.

The prime moving part of the mechanism is a spring-controlled trigger which serves to feed the ticket strip by means of a positively acting lever mechanism and automatic clamping and releasing devices for the strip, the parts embodying features of much originality and of simple form, as will be obvious from Fig. 2. The strip is fed a predetermined distance, then held while a knife acts to perforate the strip and facilitate detachment of the ticket by the patron or the employé. It is purposed to intersperse at intervals tickets marked "Free," to induce the patrons to watch the apparatus. The feeding devices are adjustable, that the machine may be adapted to feed according to the length of the ticket used.

Coacting with the other mechanism is a series of registering wheels provided to register the sales. In connection with the cover of the apparatus, a novel combination lock is provided, the dial plates of which are seen in Fig. 1. The total number of tickets registered also appears through the case.

The apparatus is the invention of the late Manuel



FORTUÑO'S TICKET HOLDER AND REGISTER.

Fortuño, whose administrator is Señor Leonardo F. Fortuño, Hospiceo San Nicolas, 23, Mexico City, Mexico.

DR. ISSATSCHENKO, of the bacteriological laboratory attached to the agricultural department of the Russian government, has just made a preliminary communication on a new microbe pathogenic to rats which he has discovered, says Nature. A disease, which assumed epidemic proportions, broke out among the rats kept for experimental purposes in the laboratory, and from the liver and spleen of affected animals a bacillus was isolated, which proved on inoculation to be extremely fatal as regards both rats and mice. Receiving food infected with this organism, rats and mice invariably succumbed, the former after from eight to fourteen days, the latter after from four to eight days. Following Pasteur's example in the case of a bacillus similarly fatal to rabbits, attempts were made to turn this new microbe to practical account and utilize it as a living rat poison. The results so far have not been very encouraging, but further experiments are being made in this direction. It is apparently quite without effect upon pigeons and rabbits. As regards its artificial cultivation, this microbe is very accommodating, growing luxuriantly upon all the customary culture media with the exception of potatoes. In microscopic appearance it varies, as is so often the case, according to the nature of the medium in which it has been previously grown. It is mobile, and is endowed with lateral flagella.

FOR the purpose of cleaning bottles from fatty substances a very simple and practical process has been found. Pour warm water into the bottle, fill in ordinary hay and rub the inside of the bottle with this thoroughly, using a small stick. Now rinse the bottle out with clean water, and not a trace of the odor and the grease will remain. Large bottles which had contained petroleum were successfully cleaned in this way.—Oesterreichische Brauer- und Hopfen-Zeitung.

The Sutro Baths.

The seacoast from San Francisco is reached by either one of two steam railways or the Sutro Electric Railway, all starting from the suburbs of the city and converging near the celebrated Cliff House, in front of the Seal Rocks, says Engineering News. The old Cliff House was burned on December 24, 1895, but a larger structure was at once built, and is a great resort for tourists and people from the city. North of the Cliff House are the new and extensive Sutro Baths. On the top of the hill and overlooking the ocean is Sutro Heights, the residence of Adolph Sutro, mayor of San Francisco, but who is most widely known from his connection with the famous Sutro tunnel on the Comstock lode in Nevada. The grounds of his establishment are open to the public.

On the shore, and close to the Cliff House, are the new Sutro Baths, established and built by Mr. Sutro, which were opened in March, 1896. The buildings are handsome and spacious, and form a pleasure resort for visitors as well as bathers, there being a museum and other attractions, and cheerful promenades lined with palms and growing plants. The entire building is 499·5 by 254·1 feet, and contains about 600 tons of iron-work in the columns and roof trusses, 270,000 cubic feet of concrete, 3,500,000 feet of lumber and 100,000 square feet of glass. Provision is made for spectators at aquatic sports and swimming matches, there being seating capacity for 3,500 persons in the amphitheater and 3,500 on the promenade, while the total capacity of the building, including the aisles, etc., is 25,000 persons. There are seven swimming tanks, as follows: One large tank, 1,409,062 gallons capacity; four small tanks, 70, 283, 400 and 875 gallons; one medium size tank, 112,500 gallons, and one fresh water tank for plunges. There are nine springboards, and seven toboggan slides lined with sheet brass and having a continuous stream of water running down them. There are 517 private dressing rooms and 9 club rooms, the total capacity being 1,110 persons; 29 dressing rooms and all the club rooms are fitted with shower baths, and there are 66 shower baths in all. The laundry equipment can handle 20,000 bathing suits and 40,000 towels per day. The restaurant is on three floors, with an area of 30 by 75 feet on each floor. The water for the baths is taken from the waves or rollers which break on the reef on which the baths are built.

A catchwater basin, 75 by 150 feet, was blasted out of the rock, and this receives the water from the waves, which then flows to the receiving pond, and through a tunnel to the settling tanks, whence it goes to the various bathing tanks. With a high sea rolling in, the tanks can all be filled in an hour. A centrifugal pump with a capacity of 6,000 gallons per minute keeps up a constant circulation, and can fill the baths in from five to six hours. The tanks can all be emptied in an hour, at high or low water, through an outlet of 24 inches diameter, the waste water being led away to a point where it is discharged into a tidal current, so that there is no chance of its being at once taken in again. The water is heated by a system devised by Mr. Sutro, using direct steam driven through small tunnels. The temperature is graduated in the different tanks, and in the smaller tanks it can be raised 10 or 20 degrees in a few minutes. The bath buildings are protected on the west by a breakwater lying north and south, 400 feet long, 20 feet deep, 25 feet wide at the top and 75 feet at the base, containing 450,000 cubic feet of rock; another breakwater runs east and west, this latter being 300 feet long and of the same cross section, containing 300,000 cubic feet of rock.

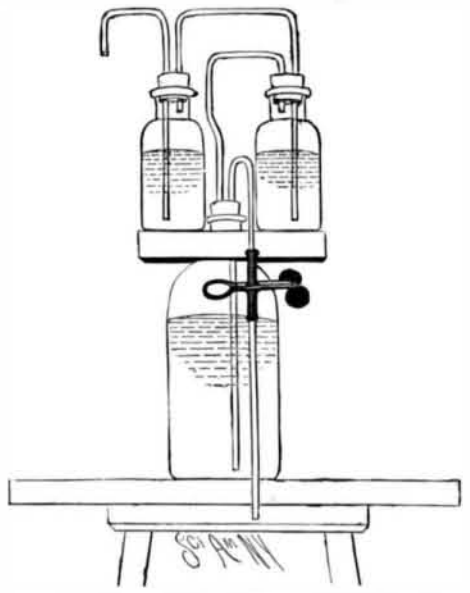
The Current Supplement.

In the SCIENTIFIC AMERICAN SUPPLEMENT of July 23, 1898, will be found many articles of unusual interest to our readers. On the front page is a fine engraving of England's newest battleship, the "Albion," accompanied by a full description of her engines, armament, and general construction. "The Naval War Game—A Strategical Campaign," is a highly interesting article describing by means of Mr. Fred T. Jane's apparatus an imaginary sea-fight off Falmouth, in which the "Indiana" and "Massachusetts" play an important part. The Armstrong discharge tube for torpedoes is exhaustively treated in an article illustrated by nine diagrams. Admiral Câmara's fleet forms the subject of a full page engraving. The new Maxim-Schupphaus smokeless powder is treated at considerable length in a fully illustrated article. Mons. H. Poincare in a very scholarly essay tells of "The Stability of the Solar System," and Mr. Willis H. Moore, Chief of the Weather Bureau, writes on the "United States Atmospheric Survey." The subject of wireless telegraphy is treated in a descriptive article illustrated by details of the apparatus employed. "New Cycle Details" is an article which is illustrated by numerous drawings and which will prove of no little interest to many bicycle riders. The mineral resources of the Philippine Islands are discussed by Frank Karuth, F.R.G.S. Taken as a whole, the current SUPPLEMENT has covered a very wide field and covered it well.

APPARATUS FOR PRESERVING PYROGALLIC ACID SOLUTIONS.

BY RANDOLPH BOLLING.

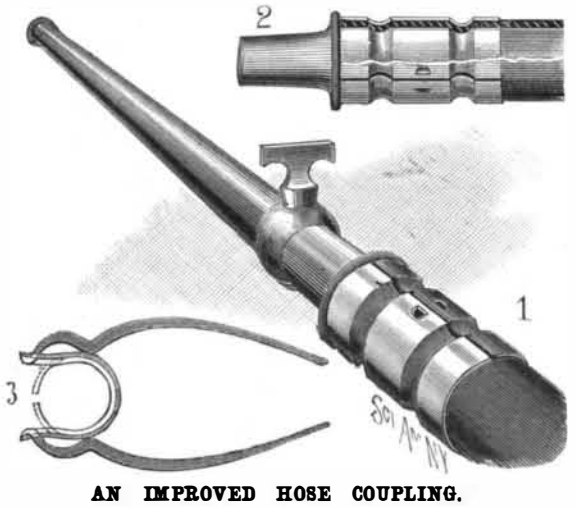
I have devised this piece of apparatus especially for the use of photographers who use a solution of pyrogallic acid and other chemicals to act as a reducing agent on the silver salts of the photographic plate. The use of the so-called "developing solutions" has



almost ceased, due to the solutions becoming brownish from absorption of the oxygen of the air, and so rendering them useless for developing purposes, and requiring a fresh solution to be made up. The explanation of the solution spoiling was simply that repeated opening of the bottle allowed oxygen to come in contact with the pyrogallic acid, which, having a strong affinity for it, combined with it, forming a brown or black compound, and the mixture had to be thrown away. To avoid this I have constructed a simple piece of apparatus which any one can make with a few bottles and a yard of glass tubing. Take a quart bottle, which is to serve as a stock bottle, and, having bored two holes in the cork, pass a bent glass tube through it to the bottom; now connect a short tube by means of a gum tube to this and you have a siphon; slip a pinch cock on the gum tubing so as to regulate the flow of the liquid. Above the large bottle is a yoke of wood having a slot sawed in it. This fits the neck firmly and serves as a support for the two absorption bottles, which are connected with each other and the central bottle with glass tubes; so that when the pinch cock is opened the liquid flows out of the stock bottle by way of the siphon and the air to replace it bubbles through both the absorption bottles. The two small bottles are filled with a strong solution of potassium hydroxide and pyrogallol dissolved in water, so that the air in coming into the apparatus has to bubble through a solution which completely removes all of the oxygen, leaving only the nitrogen, which has no action on pyrogallic acid. You can keep a developing solution for years without the slightest alteration, as nitrogen gas does not combine with pyrogallic acid.

THE "SIMPLEX" HOSE CLIP.

The purpose of this device is to provide a means for conveniently and efficiently securing hose to couplings or to the shank of the nozzle. It consists simply of a split, tubular, metallic spring band, the ends of which



AN IMPROVED HOSE COUPLING.

can be readily forced apart either for applying to hose or removing from the same. It is possessed of sufficient resiliency, and upon its inner surface are beads or projections so spaced as to effectually press the hose into the indentations of the coupling.

To remove or apply the band, a pair of levers are employed, each being inserted in the special openings provided at either end of the band, and then approximated at their distal extremities, Fig. 3. Figs. 1 and 2 exhibit the clip as applied to hose at the nozzle and to an ordinary hose coupling. It is the invention of Mr. John T. Duncan, of 69 Talbot Road, Bayswater, London, England.