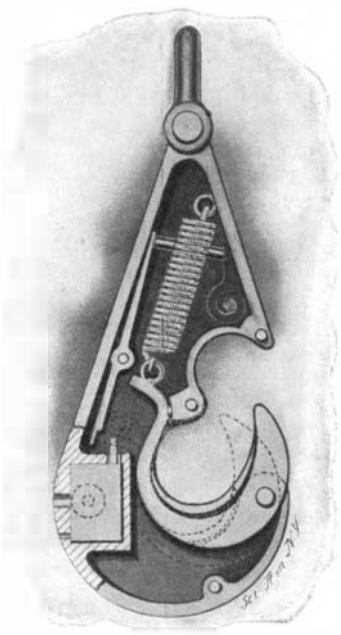
SAFETY HOOK PROVIDED WITH COUNTING MECHANISM

In the accompanying illustration we show an improved hook recently patented by a German inventor. It is so arranged as to automatically lock onto the article which is to be lifted, and at the same time to operate a counting mechanism. By this means the operator is relieved of the duty of counting the number of articles lifted and transported by his crane or other mechanism. When a job is completed, he can tell at a glance just how many operations have been performed with the hook. The hook consists of a hook-shaped casing, to the front end of which the hook proper is pivoted. A spiral spring normally holds up the rear end of the hook, causing it to occupy the position shown in full lines in our illustration. When a load is suspended on the hook it causes the hook to swing on its pivot to the dotted position shown, thereby closing over the cable or other means of attachment to the load. With the hook in this position it will be observed that the weight of the load is carried by the casing, and the hook merely acts as a guard to prevent the load from slipping off. In order to prevent the device from accidentally opening, a locking lever is provided, which snaps over the rear end of the hook when it is in its lowest position. This lever may be moved out of engagement with the hook by pressing a stud at the upper end of the device. The counting device is shown at the left of the device, and is operated by the hook, which, when in its lowest position, depresses a pin on the counting attachment, and registers either with a printing device or a pointer swinging over a dial.



SAFETY HOOK PROVIDED WITH COUNTING DEVICE.

Underground vs. Overhead Telegraph Cables.

Owing to the widespread havoc that is wrought to the overhead telegraph wires of the British Post Office laid through the midland and northern counties, through gales, often causing a serious dislocation of business, the government decided to test the advantages of a subterranean cable as a solution of the difficulty. The first section was laid three years ago between London and Birmingham. During the whole time this cable has been in use there has been no defect or derangement of working, though the overhead wires north of Birmingham have often been broken down and the business centers of Liverpool and Manchester have been quite isolated from London. Owing to the serious inconvenience thus caused, and the satisfactory working of the London-Birmingham cable, a scheme is now being carried on by which all of the overhead wires extending across exposed weather zones are to be supplanted by underground cables.

An experimental cable was at first continued from the Birmingham end of the London cable as far north as Warrington. It was subjected to severe trials, and these were so satisfactory that now this experimental cable is being pulled out and a permanent trunk cable is being installed.

The cable is being laid in a 3-inch cast-iron pipe. It consists of 103 wires inclosed in a leaden sheathing. Seventy-four of the wires are twisted in pairs and the remainder are single wires separately wrapped with a tape of copper for the purpose of screening the wires from inductive action. The pairs of wires may be used for telephonic purposes, but their primary use will be for high-speed telegraph circuits. The necessity for double wires for the latter is to reduce capacity of the wire. When the capacity of a wire is increased the speed at which it is possible for a circuit to be worked is decreased. Underground wires have very much greater capacity than overhead, but by using another wire for the return path instead of the earth, the speed of a circuit can be considerably increased.

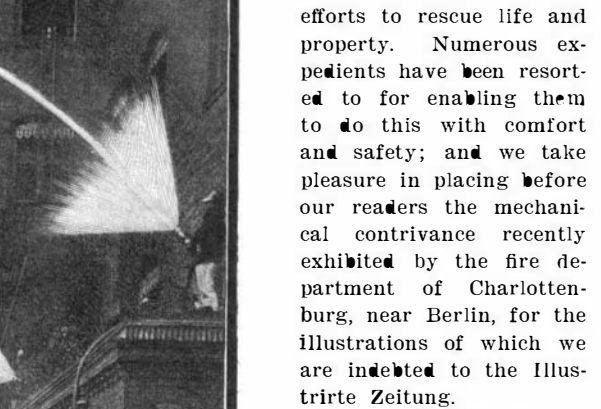
The route from Birmingham is *via* Walsall, Cannock, Stafford, Eccleshall, Woore, and Nantwich. At the present time the cable has been completed to Eccleshall. The whole of the cables have been pulled into pipes, but between the last-named place and Nantwich the lengths of cable still require to be joined together.

It is anticipated that the cable will be carried to Warrington before the end of March. At Warrington, lines connecting Liverpool and Manchester will be tapped. It will then be possible to work from London to those cities by means of underground wires.

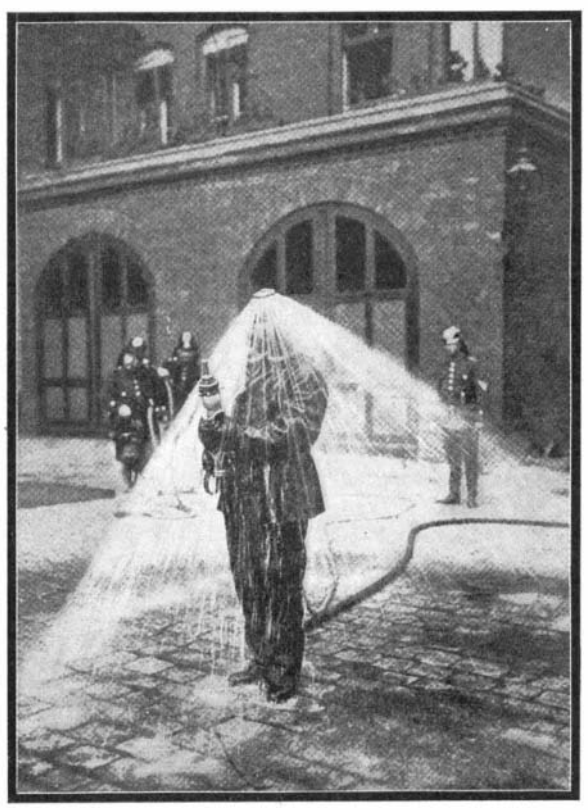
When this scheme is completed it is proposed to continue the cable to Carlisle so that there will be a continuous underground trunk cable, free from interruption, direct from London to the extreme north.

A POWERFUL COMPRESSED AIR CLAMP.

The value of compressed air in submarine work is being appreciated by the invention of various kinds of mechanism which is operated from above the surface of the water, the air being supplied through hose connections just as it is furnished the diver. The accompanying photograph shows a device which is utilized in crib-work and other submarine construction. It is really a gigantic grip of steel, which is employed for holding timbers together temporarily until they can be bolted into place. The grip is usually handled by a crane, and when in position the end opposite the cylinder is submerged, being adjusted beneath the timber to be held while the cylinder end is placed above. Merely by turning a valve, the compressed air forces the piston of the cylinder against the timber and clamps it securely until the bolts can be adjusted, when, by relaxing the air pressure, the piston is released, and the grip can be at once moved to another position. By using this apparatus the services of a diver can be frequently dispensed with, while it also avoids considerable other manual labor.



CLAMP OPERATED BY COMPRESSED AIR FOR SUBMARINE WORK.



A WATER SHADE.

NOVEL APPLIANCES FOR FIGHTING FIRE.

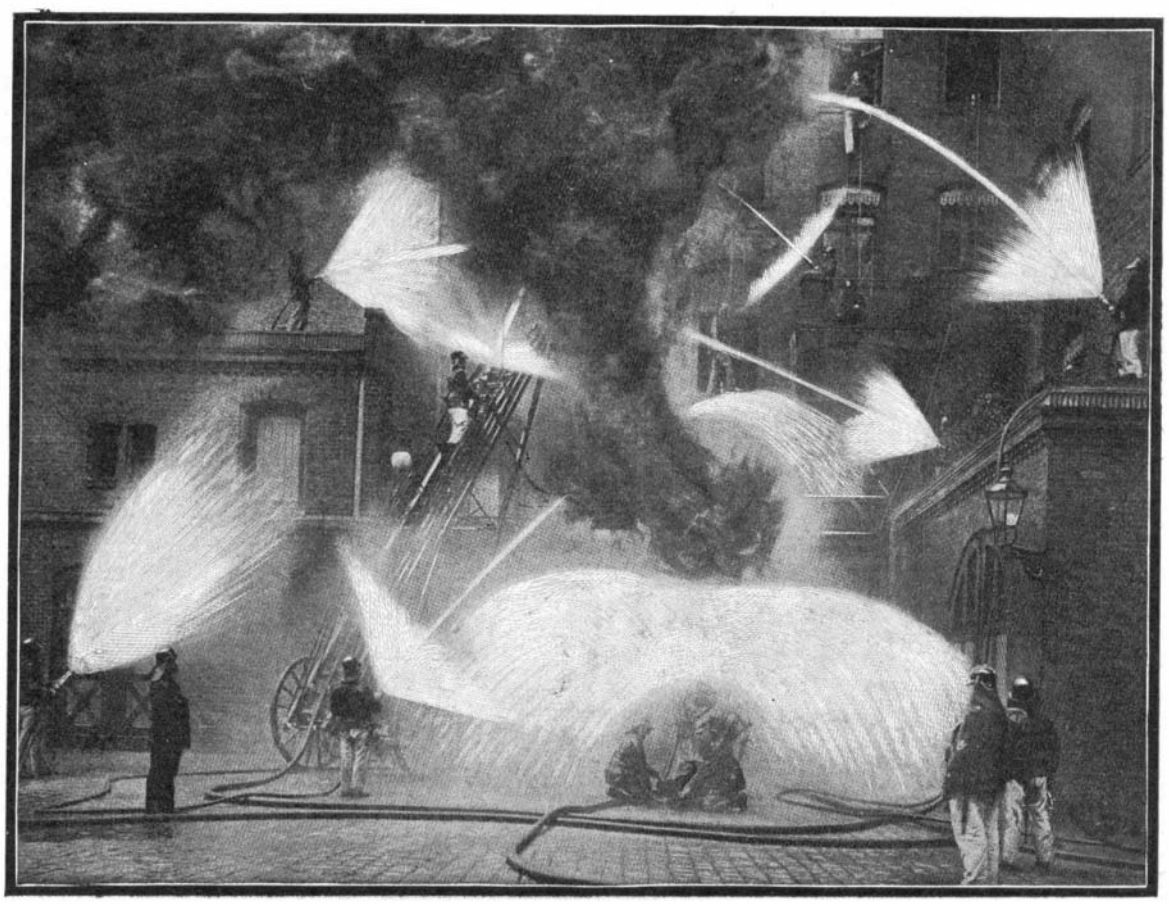
One of the main characteristics which differentiate man from the lower animals is his ability to produce fire. Just how early in the existence of the human race this ability appeared is not clearly known, but it is certain that primitive man had not acquired it for a considerable period.

Having once obtained the power of producing combustion at will and of keeping it up for an indefinite time, fire became perhaps man's greatest friend, and surely a highly important adjunct to his ultimate civilization. Yet when this mighty destructive force is uncontrolled, it becomes a most potent and dangerous enemy, scarcely less to be dreaded than a plague.

Of this latter truism history has not been wanting in examples, and we ourselves have only recently had two most appalling exhibitions of its power for destruction. Methods and means for fighting and conquering this dread enemy to human life and treasure, occupy the minds of experts continuously. For small and relatively unimportant conflagrations, acids giving off heavy and non-combustible gases are found efficient, but where the surface attacked is not circumscribed within narrow limits, this will not do, and recourse must be had to water, the greatest extinguisher of fire, and at once the most abundant and easy to provide. How to apply water in the most effective manner has long been the problem.

Close proximity to the fire is requisite to overcome it; but there is no fierce fire which does not supply intense heat and blinding smoke in large quantities, and these are the greatest obstacles which the fire fighters have to combat in their efforts to rescue life and property. Numerous expedients have been resorted to for enabling them to do this with comfort and safety; and we take pleasure in placing before our readers the mechanical contrivance recently exhibited by the fire department of Charlottenburg, near Berlin, for the illustrations of which we are indebted to the Illustrirte Zeitung.

To protect the fireman from the wall of flame and dense cloud of smoke, while at the same time enabling him to play water upon the burning building, is the main object of the invention. The pictures are from photographs recently made in the courtyard of the Charlottenburg fire station, and they present a realistic view of a fire fought from behind the watery protection afforded by the new appliance. In the larger pic-



FIREMEN EMPLOYING THE SWIFT NOZZLE, SHOWING HOW WIDELY THE STREAM CAN BE DIVERGED.

ture, the various working effects produced by the Swift nozzle are patently shown.

The Swift nozzle has a simple annular mouth-piece, which is about 2 centimeters back of the stream exit, and situated behind a collar cast upon the nozzle itself. The walls of the latter are perforated to the interior, and over these perforations, for the purpose of deflecting the issuing water, a beveled sleeve is threaded. The screwing in or out of this sleeve produces the variety of protective screens shown in the cuts. The contrivance is very simple, easily manipulated, and its degree of efficiency is amply demonstrated. The larger picture shows eight firemen in the act of attacking a flaming structure, from which issues huge volumes of smoke. The degree of the deflection of the secondary stream is shown to be from a wide spray thrown upon the burning building to a conical spray protecting the fireman and yet projecting forward, to an almost flat circular disk of water, which beats back the smoke and heat from the advancing man. Again, under a protecting canopy of water, a man almost asphyxiated by smoke is being resuscitated.

In the smaller picture, a combination of the Swift nozzle with the smoke hood and speaking apparatus is shown. Provided with oxygen to breathe and a veil of water to keep back the heat, the man can enter most dangerous places, and, by reason of his ability to communicate with his comrades without, can keep them informed as to the progress of the work within. By means of the Swift nozzle he can, as occasion demands, extinguish the flames with a wide-spread spray or a powerful and well-directed solid stream.

The smoke hood in use here is the invention of Herr König. It consists of a sort of diver's hood provided with glass eyes and valves for the exit of the air, which is pumped into the hood through a wire-bound tube or hose attached to the fireman's waist and carried up his back to the entrance into the hood. König's mode of speaking to the men outside was effected through the column of air in the tube, but this has been improved by running a fine telephone wire throughout the length of the hose, connecting a microphone speaker opposite the mouth of the operating fireman with a receiver at the engine or pumping station. Three men are necessary for the effective employment of this combination—one to do the work in the face of the danger, one to look after the air tube and life line attached to the first, and one to attend to the phone and the water hose leading likewise to the first. Sight must not be lost of the fact that though apparently well protected by this apparatus against the dangers of asphyxiation and burning, the movements of even the strongest man cannot fail to be hampered by the added weight of the waterproof clothing, not to mention the burden of the hood and extra hose. An element of danger lies also in the attachment of the parts to his person. Precipitous flight would be out of the question.

A man without apparatus could simply drop his hose and flee in any direction where danger seemed less aggressive, whereas a man provided with these safeguards must needs retrace his steps the way he came, carefully avoiding entanglements, or perish.

Again, there may be doubts where such powerful pumps as we employ are used, which require several men to hold a nozzle, whether such contrivances would be applicable. Could a man stand up under them? Hardly; and yet much may be learned from them. Perhaps we do not need all the water we throw upon a burning building; perhaps fewer and better directed streams would suffice to quench the most stubborn fire.

Suggestions such as these may be worthy the consideration of the greatest fire department the world has ever known. That fires occur and prove destructive is not the fault of a most excellently equipped fire department, but of the building laws. The writer lived seven years in the city of Vienna, Austria, and only witnessed three fires in all that time, two of which were theatre fires—the Ring Theatre being one—and the third the roof of a dwelling or large apartment house. Though water is plentiful there, and at high pressure, little is thrown upon the burning structure. Even at the Ring Theatre, orders were soon given to stop the water, so that the foundations might not be undermined and the walls fall in; and though the building was gutted and smoldered for a week, with the exception of some smoke around the upper windows, a little broken glass, and the absence of the roof, no traces could be seen of the fire from the street, while as for the roof fire, the destruction got no further than the top floor.

The big flagstaff of the House of Hoo-Hoo has reached the World's Fair grounds. The timber is 60 feet long and 12 inches in diameter at the base. The House of Hoo-Hoo is built entirely of wood and is intended to form a museum of the lumber products of the United States as well as a handsome club house for lumbermen.

Engineering Notes.

A pamphlet has been published by the Austrian War Ministry concerning the utilization of bronze, instead of steel, in the manufacture of heavy guns. Austria is now the only country which employs bronze as the material for its heavy cannon, and it is the intention of the government to retain it. This official pamphlet states that this bronze, forged according to a secret process, is equal to nickel steel. Moreover, the cost of the inner tube is three-fifths less than that of the steel tube. Another advantage is that an injured bronze gun can have a new jacket fitted to it, which is difficult with a steel one. Lieutenant Field-Marshal Uchatius, who in the seventies discovered a special process for forging bronze, also found that good homogeneous bronze could be hammered in a hot or cold state, and therefore can be improved in quality. Lieutenant Field-Marshal Frederick Thiele, the present director of the Vienna Arsenal, also obtained very favorable results in forging this metal, producing a kind of bronze not surpassed by the best cannon steel, through a combination of metals, careful alloying, and judicious rolling.

At the works of the Yarrow shipbuilding firm of London, interesting experiments have been carried out concerning the ratio of the grate area to the heating surface of boilers. This is an important consideration, as upon this proportion depends to a very appreciable extent the efficiency of the boiler, especially if it is of the water-tube type. For the purposes of these tests a water-tube boiler equal to 1,200 indicated horse power was employed. This boiler had 1,008 tubes, each 1¾ inches outside diameter, with an average length of 6 feet 9¼ inches. The test was conducted with a boiler having 53 square feet of grate, and with 3,217 square feet of heating surface, giving a ratio of 1 to 60.7. In the second test the grate was reduced to 40 square feet, with a slight change in the heating surface, giving a ratio of 1 to 78.2. The results showed that there was a much higher evaporative efficiency with the smaller grate. Each pound of fuel consumed gave with the small grate 10.57 pounds of steam, while in the other case it only gave 9.96 pounds. But it was also decided that irrespective of this, the same boiler should give an equal volume of steam, and thus the quantity of coal consumed per square foot of grate had to be increased. For instance, with the larger grate the rate was 29.7 pounds of fuel, and with a less area 39.31 pounds. To burn the greater quantity more draught was required, 0.75 inch as compared with 0.56 inch. These results are highly valuable, for the greater efficiency of the small grate would reduce the fuel consumption on a vessel to a very appreciable extent. The explanation of this greater efficiency is that the gases of the fuel are consumed more quickly, and are not so likely to come into contact with the cold surfaces of the tubes in an unburnt state.

It is stated that an American syndicate has proposed to the Russian government to construct a canal from the Baltic to the Black Sea for the sum of $160,000,000, which is one-third less than the estimated official cost. The junction of its great northern and southern seas by a navigable estuary of sufficient width and depth to permit of the passage of men-of-war and ships of great tonnage has long been a favorite project in the councils of the Czar. At the present stage of the undertaking there are two, and only two, plans of procedure. One is to utilize the existing Beresina Canal by widening, deepening, and generally extending it, and the other, to adopt a perfectly new route altogether. According to the Uhland Verkehrszeitung, the plans of the canal have been recently deposited with the Minister of Ways and Communications, in which the proposed new route has been minutely and fully defined. The canal will commence at Riga, which, next to St. Petersburg, is the most important of the Baltic ports of Russia. It will avail itself, wherever practicable, of such portions of rivers, canals, and other waterways it may meet with in its course as can be made to profitably contribute to the success of the whole undertaking. For 125 miles it will absorb a part of the channel of the Divinea, as far as the fortified town of Dunaburg. Thence it will run through a deep straight cutting 100 miles long, and join up with the river Beresina at Lepel. From this point it will follow the canalized river to its junction with the Dneiper, and use the latter stream for the rest of its course to the Black Sea at Kherson, to the west of the Crimea, near Odessa. From the one sea to the other the distance will not be less than 1,000 miles by the new scheme of inland navigation. The cost of construction, according to the offer made, would amount to $160,000 per mile, which is not an unreasonable price to pay. In addition to the value of the canal as a considerably cheaper route for the transport of goods, it would in war times possess a strategic importance probably exceeding that belonging to the "Kaiser Wilhelm" waterway. It is calculated that Russian armorclads could thus navigate the kingdom from sea to sea in half a dozen days.

Electrical Notes.

The first part of the new German Atlantic cable between Borkum and New York has been completed, thus fulfilling the conditions under which the German government placed the German Atlantic Telegraph Company in regard to the laying of the cable. The section completed is that between Borkum and the Azores. Under the agreement between the government and the company the latter will receive a sum of £35,700. The second part of the cable between the Azores and New York, which will complete the line, is to be laid by the end of the current year.

Owing to differences of opinion between the state, the municipal authorities, and the owners of the Tuileries Garden in Paris, the electric lighting of the garden has been much delayed. The main question in dispute, as to who should direct the work, has, however, now been settled in favor of the state, and although the city engineers are actually conducting the operation of laying the wires, it is under the superintendence and direction of the government. The type of lamp decided upon by the latter is known as "Arc Nouveau," and is far finer than that proposed by the city. The lamps will bear comparison with the four beautiful standards which now adorn the four corners of the Place de la Concorde, or with those others, different but equally handsome, around the Opéra.

The Electrical Engineer (London) stated a few weeks ago that it is Mr. Marconi's intention to make a test of his wireless telegraph system at long distances overland. So much of his experimental work has been carried out between coasts, that it will be refreshing to watch the performance of the system across country. For this purpose Mr. Marconi is erecting a station at Fraserburgh, in Scotland, with a view to establishing communication with his Cornwall station at Poldhu. The Scotch station, however, will also be used for communication with ships, and it is ultimately intended to establish communication between the North of Scotland and Iceland. Mr. Marconi is now at Fraserburgh, but will shortly cross the Atlantic on a visit to his wireless telegraph installations on the St. Lawrence River.

The Osiris prize has been divided between Madame Curie, in recognition of her part in the discovery of radium, and Prof. Branly, inventor of the system of wireless telegraphy which bears his name. The prize is worth $20,000, and was offered by M. Osiris in 1900 for any work which should be deemed useful for mankind by the members of the Syndicate of the Paris Press. The prize remained undistributed until it was recently suggested by the founder that the claims of the Curie family should be considered. It was then decided that Madame Curie and her husband should receive $12,000, and that the remaining $8,000 should go to Prof. Branly. The ceremony of presenting the respective amounts took place in Paris recently, when the hope was expressed on behalf of M. Osiris that Madame Curie would be able to continue her researches in the interests of science.

The illumination of the outside of the buildings and grounds at the World's Fair to be held at St. Louis this year will probably be the biggest piece of work of its kind that has yet been carried out. The contract provides for 300,000 incandescent lamps. These lamps are for lighting the exhibit places, grounds, and architectural features of the exposition proper, and do not include those for state, national, and private concession buildings. To give an idea of the distribution of the lamps, it is stated that 12,000 alone are to be placed on the Palace of Education, which building furnishes an excellent setting for night effects produced by the electric light. The illumination of the grounds is to be carried out on very ambitious lines. Each monumental standard will carry 24 incandescent lamps, so distributed that 12 will hang on each arm of the supporting post. The lighting of the inside of the buildings will be accomplished entirely with arc lamps.

Mr. H. B. Ford, of New York, has patented the construction of a zinc amalgam electrode for use in secondary batteries. According to the Electrical World, he fills a thin porous wooden cup partly with mercury and places into it a thin copper plate plated with zinc and corrugated in a vertical direction. For the other electrode he uses a copper plate covered with peroxide of manganese. As electrolyte, dilute sulphuric acid of 25 deg. Baumé is used. The charging current causes the mercury to act upon the zinc and copper plates in the usual way, and also forms by the absorption of hydrogen a mercury sponge containing also some zinc, which expands upwardly until (if the preparations be correct) the porous cup is practically filled. In the discharge of the battery there is double action of the oxygen upon the zinc and upon the absorbed hydrogen respectively. The action upon the hydrogen is first completed, resulting in the disappearance of the sponge. So long as the latter remains the voltage is about 2.5. Upon its disappearance the E. M. F. drops to about 1.5 volts.