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NEW YORK, SATURDAY, DECEMBER 3, 1887.

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(Illustrated articles are marked with an asterisk.)

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SCIENTIFIC AMERICAN SUPPLEMENT

No. 622,

For the Week Ending December 3, 1887.

Price 10 cents. For sale by all newsdealers.

THE DECISION IN THE DRIVEN WELL SUIT.

Copies of the full text of this important Supreme Court decision have now been received. The patent is declared invalid because the invention had been in public use two years before Green, the inventor, filed his application. This fact was conceded by the appellants to the Supreme Court. The appellants sought to sustain the patent while conceding this much by claiming that such public use did not render the patent invalid, because it was without the knowledge or consent of the patentee. The whole case turned, therefore, on this point, which involved the interpretation of the statute of March 3, 1839, in connection with certain sections of the statute of July 4, 1836.

This question has arisen for the first time among the numerous driven well cases, and curiously enough it had never been decided at all by the U. S. Supreme Court.

As the Green driven well patent was issued prior to the passage of the patent act of 1870, it had to be judged by the earlier statutes. So as a species of farewell decision upon them, this opinion is rendered upon one of their critical points. The court finds that knowledge or consent of the patentee was not needed under the old statutes to render a patent invalid where the invention had been in public use for two years before the date of application. This decision disposes of the famous driven well litigation, which by the expiration of the patent was fast losing interest except as a matter of history.

WAR SHIPS THAT ARE WEAK AND SLOW.

Captain Bunce's report to the Secretary of the Navy on the new cruiser Atlanta shows that ship to be ill adapted if not positively unfit for the purposes of war. He has commanded her since she was in commission, and we may, therefore, be sure he had ample opportunity to study her defects. The ship, he says, is well nigh unmanageable in rough weather, and her battery is too heavy. Add to this that she is both unarmored and slow, and it remains she can neither fight nor run away. Of the sister ship Boston, like unto her in construction and armament, the same is exactly true. Capt. Bunce suggests some fifty alterations, one of which is that she be built up out of the water both forward and aft. Such changes, it is said, would cost something like a quarter of a million and perhaps much more. These alterations, though adding to her buoyancy, would in no wise improve her speed, and it may thus be seen how profitless would be the task of the constructor who should undertake them.

It ought to be said here that in nowise can the Atlanta's defects be laid at the door of the contractor who built her, and there is not a word that could be construed into such an inference in Captain Bunce's report. It was not the contractor who decided she should have low bulwarks, not he who miscalculated the position of her load line when her guns were mounted and her coal bunkers full, not he who limited her speed to sixteen knots under favorable conditions. All this was done for him by the Naval Advisory Board. What could this Board have been thinking of? is the question that naturally suggests itself to those who rank far beneath its members as authorities on naval construction. They took for their model the Esmeralda, that admirable ship built for the Chilians by the Armstrongs, but seem to have utterly lost sight of the advantages of her wonderful speed while searching, vainly, it seems, for more stability. Speed, it has been shown, is more to be desired than heavy armor; but to an unarmored ship speed is, of course, a prime necessity, else she might find herself opposing her eggshell sides to the assault of heavy guns, and though these sides, like the Atlanta's and Boston's, were backed with bunkers filled with coals, they would, likely enough, prove at best but a sorry protection, if they afforded any at all.

But we are told: "These ships are not intended for the line of battle at all. They are simple cruisers for the protection and attack of commercial ships in time of war, and to carry the flag to different ports in time of peace. Their function is rather to keep the peace than to make war, and they are properly designated as 'the police of the sea.' They must, of course, be able to defend themselves from enemies of approximate size and similar character, and to escape by their speed from heavily armored ironclads of the enemy."

This is all very well, but with the exception of showing the flag, which our old hulks of antique type are quite able to do, these new cruisers are unable to fulfill the conditions as laid down by their apologists. They would not be able to protect commercial ships, because a reference to the muster of foreign ships shows many of them that have sufficient speed to overhaul them and power to beat them off; and as to their capacity to come up with the fast steam fleet of the European mercantile marine, it is immediately obvious that they are nothing like fast enough. As to the power of the guns of these cruisers to stand off an enemy, it were a bootless errand to inquire, because, as we have seen from Captain Bunce's report, not to mention the recent disastrous trials, they are not structurally strong enough to carry such guns.

As to the Chicago, Admiral Porter has told us over his own siguature that she is filled with machinery of a complicated kind, put into her, willy-nilly, through the agency of the four branches of the circumlocution office which furnish machinery for ships, and that a merchant steamer, which he names as carrying engines of a similar type, spends half of her time laid up for repairs. There are war ships afloat to-day, not unarmored cruisers, but line-of-battle ships, that have a record of over nineteen knots an hour. There's the Spanish ship Reina Regente, with a record of 20·6 knots over the measured mile; the Dogali, built in England for the Italian government, 19·66 knots; the Orlando, built by private contractors for the English government, 19·25; and there are others which do not fall far short in speed of nineteen knots. How could an Atlanta, or a Boston, or a Chicago protect or attack a merchant fleet with such ships at hand? They could neither fight nor fly from them. What we want are fast cruisers, at least as fast as any afloat. Yankee ingenuity, which has never failed when put to the test, ought to be able to construct them. It is certain that Yankee ambition will not be content with any others.

POSITION OF THE PLANETS IN DECEMBER.

VENUS

is morning star, and may be found near Spica during the first part of the month. She reaches her greatest western elongation on the 2d, being at that time 46° 49′ west of the sun, and rising nearly four hours before the sun. Venus rises on the 1st at 3 h. 6 m. A. M. On the 31st, she rises at 3 h. 54 m. A. M. Her diameter on the 1st is 25″, and she is in the constellation Virgo.

MERCURY

is morning star. He reaches his greatest western elongation on the 6th, and is then 20° 36′ west of the sun. He is at that time and for a few days before and after easily visible to the naked eye. He rises at elongation nearly two hours before the sun. He is in conjunction with Jupiter on the 4th, being then 1° 35′ north, and may be more readily found, the brighter planet serving as a guide. Mercury rises on the 1st at 5 h. 21 m. A. M. On the 31st, he rises at 6 h. 51 m. A. M. His diameter on the 1st is 7″, and he is in the constellation Libra.

SATURN

is morning star and a most interesting object for observation as he makes his way through the cluster of stars in Cancer called Praesepe. He rises early in the evening in the northeast, and continues visible during the night. If the twin stars Castor and Pollux are familiar to the observer, Saturn is the first bright star southeast of them. Saturn rises on the 1st at 8 h. 37 m. P. M. On the 31st, he rises at 6 h. 31 m. P. M. His diameter on the 1st is 18·4″, and he is in the constellation Cancer.

JUPITER

is morning star. He is a conspicuous object throughout the month, rising an hour and a half before the sun at its commencement, and three hours before the sun at its close. Jupiter rises on the 1st at 5 h. 34 m. A. M. On the 31st, he rises at 4 h. 7 m. A. M. His diameter on the 1st is 29″, and he is in the constellation Libra.

MARS

is morning star. On the 12th, he is in conjunction with Eta Virginis, a star of the fourth magnitude. A good opera glass will show the planet and the star in the same field. Mars rises on the 1st at 0 h. 58 m. A. M. On the 31st, he rises at 0 h. 15 m. A. M. His diameter on the 1st is 6″, and he is in the constellation Virgo.

URANUS

is morning star. He rises on the 1st at 2 h. 33 m. A. M. On the 31st, he rises 0 h. 40 m. A. M. His diameter on the 1st is 3·5″, and he is in the constellation Virgo.

NEPTUNE

is evening star. He sets on the 1st at 6 h. 12 m. A. M. On the 31st, he sets at 4 h. 7 m. A. M. His diameter on the 1st is 2·6″, and he is in the constellation Taurus.

At the close of the month, Saturn, Mars, Uranus, Jupiter, Venus, and Mercury are morning stars; Neptune is evening star.

Intellectual Improvement.

"The habit of regular reading, if only for fifteen minutes each day, should be steadily cultivated throughout life. Besides the leading journals of his trade, which no carriage mechanic can afford to disregard in these days, at least one good daily paper should be read; and some standard work on science, history, or biography should be kept on hand for convenient opportunities; while an occasional light novel, when the mind is too weary for more solid food, will certainly do no harm. We also recommend the SCIENTIFIC AMERICAN as an instructive weekly record of progress in all the arts and sciences, which will be found stimulating to the active mind and broadening in its influence. The constant study of that journal is a technical education in itself."

We heartily indorse the foregoing, especially the two concluding sentences, for which we are indebted to that able and most excellent periodical, *The Hub*.

Native Sheep of South America.

Consul Baker, of Buenos Ayres, in his last report, says that at the time the Spaniards first visited South America there were no animals in the country which exactly corresponded to the sheep of Europe, but they found in Peru, and in the regions of the Andes, several species of animals to which they gave the name of native sheep (*carneros de la tierra*), but which the aborigines called the llama, the alpaca, the guanaco, and the vicuna. The two first named varieties were even then nowhereto be seen in a wild state, but were domestic animals in the service of the natives. While there is a general similarity between these several classes, yet each one seems to form a distinct genus. The llama and the alpaca are of various colors, and sometimes speckled.

The guanaco and the vicuna are generally of a single color—brown, approaching to red. The llama and the alpacaare said to be so resigned to their state of domesticity that they are scarcely able to take care of themselves or live in a wild state.

The guanaco and vicuna prefer the wild state. Although these animals are all indigenous to the Cordilleras of the Andes, none of them are found north of Ecuador, neither in Quito, Bogota, nor Caracas, where the climate is similar to that of Peru or the Argentine Republic. The guanacos are especially found in the extreme southwestern portions of the province of Buenos Ayres, and in the desert ranges of Patagonia, as far south as the Straits of Magellan. There they are the principal food of the Indians, their skins being used for clothing and for coverings for their wigwams.

The Chilians and the Auricanian Indians also have an animal, which they call the *chilihueque*, which is supposed to be the alpaca of Peru, modified by the climate, and which they formerly used as a beast of burden, but the use of which has, in a great measure, been superseded by the introduction of mules. Of the several varieties of native sheep, the largest and strongest is the llama. It was especially esteemed by the native inhabitants as a beast of burden. Its load is about 100 pounds, although for short distances it is able to carry considerably more. Its height is from four to five feet, and the length of its body is about the same. It has no horns or hump, and its hoofs are cloven. Its body is shaped like that of the deer, with clean, slender legs, its cloven hoofs ending in talons or claws, like those of a bird of prey. Under its breast there is a hard substance, about six inches long and three inches wide, on which it sleeps or rests.

The llama is covered with a very fine silky hair or wool, which is not shed like that of the camel, but when properly cared for grows to a length of from three to four inches. The finest is on its legs. The animal rarely produces more than one young at a time, the period of gestation being six months, and it comes to maturity at three years of age. The Indians are very fond of the meat, esteeming it beyond that of any other animal. They dry it in quantities, and they regard the soup made from it as a sovereign remedy in nearly all cases of sickness. At ordinary labor the llama will last for twelve years, but those which are used in the mines do not live longer than three or four years, in consequence of infirmity caused by the sulphurous exhalations.

The size of the alpaca is a little less than that of the llama, its height being about four feet, the length of its body being the same, and its appearance when the fleece has been removed is very similar to that of the llama. Its hind legs are shorter than its fore ones, and are somewhat curved, and its hoofs are cloven, but the claws are very small. It drinks very little, but has a voracious appetite. When used as a beast of burden, it is capable of carrying from seventy-five to a hundred pounds, but not on long journeys. It is on account of its fleece that the alpaca is most esteemed, and this makes it the most valuable of the South American native sheep. The wool is long, soft, and abundant, being double the amount which the other varieties afford. On its side, breast, and back its fleece is from 8 to 16 inches long. It is of various colors, and sometimes speckled. Outside the wool, and sometimes protecting it, is a long hair, which is exceedingly fine, so that the fleece is really a combination of hair and wool. It is sheared by the Indians twice a year—in June and December.

The guanaco is from 3½ to 4 feet in length by about 4½ feet in height, and except in a few rare cases it is always found in the wild state. It is always of the same color—a brownish red—and in its general appearance resembles the llama, the chief difference being a greater curvature of the back, a more shaggy fleece, and smaller feet. The guanaco is the fleetest animal which South America produces, and it is so courageous that when surrounded by the hunters it will turn upon them and trample them under foot. It is generally seen in droves or flocks of from 200 to 300. The guanacos are vigilant and exceedingly circumspect in their movements, and when feeding they place one of their number as a sentinel, to announce the arrival of an enemy. The flocks which are now to be seen on the frontiers have generally a large excess of males, for the reason that, being stronger and swifter of foot than the females, they more readily escape the toils of the hunters.

The vicuna is the smallest and most delicately formed of all the native sheep, but its wool is the finest, and on that account it is the most interesting and the most highly prized. Its height is only about 3½ feet and its length about 2½ feet. It only weighs from 75 pounds to 100 pounds, while the llama weighs 250 pounds. In its general form and appearance it corresponds to the other varieties. Its head is erect, and is covered with wool of a reddish color, which is also the color of the fleece. Its wool is the finest, the softest, and the most silky that is known, and when it has been cleared of the hair that grows with it, it is regarded as the most valuable in the world. The wool on the back is without any mixture of hair, while on the rest of the body it is even longer than the wool—thus somewhat protecting it. The wool on the belly is white. The vicuna is gregarious, and inhabits the snowy peaks of the Andes, and the flocks are frequently mixed with those of the guanaco. They are very timid and difficult to secure, but it is estimated that about 250,000 vicunas are still annually hunted down.

Consul Baker says that only a small quantity of wool of any of these animals is shipped from the country. The exact amount, however, cannot be known, for the reason that the exports of wool are not classified by the authorities. The greater portion is consumed in the country, and is used by the inhabitants of the interior in the manufacture of yarns, threads, and a variety of woolen textures. The best of the native fabrics are made in Catamarca and some of the other upper provinces, but not in sufficient quantities to meet the demand.

The principal merit of the native shawls, pouches, etc., is that they are entirely impervious to water, at the same time that they are light and fine, and they readily command high prices, ranging from one to five hundred dollars, according to their finish, but it takes, says Consul Baker, many months of hard work to complete the fabrics.

Burning of Rare Animals.

The winter quarters of Barnum's menagerie, at Bridgeport, Conn., were destroyed by fire on the night of November 20. It was the work of an incendiary.

The building containing the bears, monkeys, and many smaller animals was saved. The list of the dead includes four elephants, namely, Alice, Samson, the sacred white elephant, and a smaller one, four lions, seven leopards, five panthers, two sea lions, two zebras, the hippopotamus, besides kangaroos, ibexes, warthogs, etc.

The lions first gave the alarm, in which the other animals joined, their roarings and howls of pain being heard above the noise of the flames. The rhinoceros broke his chain and came crashing through a side wall badly scorched. It is thought that he will recover.

The prompt action of Otto Mabis, the elephant trainer, was remarkable. He entered the burning building and unchained most of the elephants. Twenty-seven of these huge beasts were thus liberated. When he came to the savage Samson, by whom one keeper had formerly been killed and many a one injured, the creature knocked his benefactor down, and acted in such an ugly manner that it was impracticable to release him, and he perished. The lion tamer, Tim Buckley, also entered the building and freed a favorite old lion that followed him with the greatest docility out through a window. The appearance of all these monsters created a panic among the vast crowd that had assembled to witness the fire. One man was knocked down by an elephant, though the occurrence seemed really accidental. He had three ribs and one of his legs broken. After the first rush the elephants clustered together in an adjacent field and stood looking at the fire, until they were cared for by the keepers. Some of them subsequently wandered away, and were found in various door yards in the morning. One unlucky beast tried to swim across Long Island Sound. Failing in the attempt, he landed on a small island, whence, in the morning, some men dislodged him. He then made for the shore; but being chilled through, he sank in the muddy flats and perished.

The enormous hide of Jumbo was stored in a carriage house, and was but slightly damaged, while his bones were safe in the Philadelphia Museum.

Many ludicrous anecdotes are told concerning the rambles of the elephants and other liberated animals, which may be true or otherwise.

But the pitiful fate of the great lion set free by his keeper is worth telling. No sooner did he appear outside the burning building, than a couple of police officers began firing at him with revolvers. The keeper begged them to desist, as he was confident that he could control the animal and secure him in some place of safety. The wounded lion took refuge behind a freight car, where his keeper captured him again and presently put him into a pen. The inclosure was not sufficiently strong, however, and after a while the lion started on his travels. In jumping over a fence he alighted on a reporter for the London *Times*, who never was more surprised in his life. The man escaped with a few scratches, and the lion went its way. During the night, a Mrs. Gilligan heard a disturbance in her barn, and supposing two of the cows to be fighting, undertook to part them by pounding them with a hoe handle. The cow she was pounding proved to be the lion, and answered by a frightful growl. Giving the alarm, a neighbor brought a rifle and shot the lion dead. It was found that he had torn the side of a cow, and had begun to make a repast of her calf. The boys who visited the spot in the morning cut off the tail and paws as trophies, against the remonstrance of the owner of the cows, who felt herself entitled to damages.

The building that was burned occupied a ground space of 100 by 400 feet, and was two stories high. It contained much valuable property besides the animals, and the total loss must exceed $200,000. It is thought that Mr. Barnum will rebuild at some point nearer New York City.

The remains of most of the animals were subsequently disposed of by burning. The bones of a lion and of the hippopotamus were secured for the Yale Museum. They were found in good preservation, the latter especially being protected by his enormously thick hide. The skin was found to be fully two inches thick when the animal was disarticulated for transportation. Representatives of various medical schools were on the ground, looking after such specimens as could be obtained for anatomical study.

The Scientific American.

As the time is close at hand when intelligent people will consider the subject of subscribing for desirable papers for the coming year, we will quote the remarks of the able editor of the *News*, published at Sandy Lake, Pa., respecting our work:

"While attending Westminster College in 1857, a classmate traded us his SCIENTIFIC AMERICAN for the last half year of his subscription. We received and read it regularly every week. We at first thought it pretty dry reading, partly because we were unacquainted with the mechanical and scientific terms used in describing the machinery of which every issue had a number of fine engravings. We determined to get out of the paper as much as we could, and think we were well repaid for the time and labor spent in the reading and studying of this very reliable and able magazine. It was our rule, when we sat down to read the SCIENTIFIC AMERICAN, to lay a copy of Webster's Unabridged Dictionary on the desk where we could turn to it for the meaning or definition of any new learned, scientific, strange, or mechanical term we found in the paper and with the meaning of which we were not familiar. In this way we not only learned the meaning of a great many, to us, new and technical phrases and terms, but we soon found much pleasure and mental profit in the perusal of this standard weekly. We studied chemistry, natural philosophy, geology, and other branches of natural science with much more interest, and found our reading in the AMERICAN of great use to us in our investigation of these branches of study. We now are, and for years past have been, receiving the SCIENTIFIC AMERICAN, and though it is now twenty-seven years since we left college never to return, the taste for the study of natural science the reading of this able weekly then helped to cultivate gives us pleasure every time we can get leisure from our editorial and other work to read the paper. We may add that the SCIENTIFIC AMERICAN increases in value by age, like good wine, and we now consider it a much better paper than when we first commenced reading it in our boyhood. To young men and women of an investigating turn of mind, and to all who have a love for study, especially young mechanics and machinists, we would suggest that we know of no way they could spend the money to better advantage than by sending for the SCIENTIFIC AMERICAN, 361 Broadway, N. Y., and receiving it, study its regular weekly edition as we did, determined to learn what we could from it. Try it, and you will say it is one of the best school teachers to impart valuable and reliable information on a thousand things of practical use and permanent benefit to everybody."

Appointment of Prof. S. P. Langley as Secretary of the Smithsonian Institution.

At a special meeting of the Board of Regents of the Smithsonian Institution, held in Washington, November 18, Professor S. P. Langley was elected secretary of the Institution, to succeed the late Professor S. F. Baird.

In making this selection, a wonderfully happy choice has been made. The life work of Professor Langley has already been described by us, and his portrait appeared in connection therewith. His work in mathematics and physics and physical astronomy has won him a worldwide fame. His researches in radiant heat are already classical. He presided last summer over the meeting of the American Association for the Advancement of Science, at Columbia College. The Smithsonian Institution in his appointment will secure as earnest a worker as his lamented predecessor, Professor Baird, while in the change from biologist to physicist and astronomer as her secretary, a broadening influence will undoubtedly be felt. The portrait of Professor Langley, with his biography, will be found in the SCIENTIFIC AMERICAN of August 20, 1887.

A New Regenerative High Power Gas Lamp.

A regenerative gas lamp, which is claimed to be one of the most efficient, as it is certainly about the simplest of its order, has been perfected by Messrs. S. Chandler & Sons, of Kennington Oval. The "Chandler" lamp, as it is called, scarcely differs in general appearance from any of its congeners—the inverted-flame inclosed lamps, with air and, to some extent, gas heated on their downward course to the point of ignition by the ascending products of combustion. It has a similar central gas pipe surrounded by the same kind of chimney, rising out of the familiar enlarged semi-globular lamp body, closed at the bottom by the railway lamp glass. The flame also resembles in shape what has been seen before in more than one kind of recuperative lamp; being like an inverted mushroom. The most striking feature of the "Chandler" lamp is, however, the simplicity of the construction by which this now familiar phenomenon of the silent, steady, brilliant button of shadowless flame is produced. Strange as it may appear, the lamp has positively no burner at all. Other lamps of the genus have some sort of burner, generally of the Argand type, although the holes from which the gas issues may be made horizontally, upright, or reversed, in a steatite or metallic body. Considerable importance has always been attached to the shape and position of these burner holes, or of a slit which has been made to take their place, with reference to the form that has been imparted to the flame by these openings and by the direction and force of the current or currents of air by the aid of which the flame is sustained. All this has been suppressed in this new lamp. There is no burner, and consequently no holes—the gas supply pipe simply coming to an end at its appointed level in the body of the lamp; and the gas burning there without anything that can be called a burner tip to regulate its shape or direction, which depend wholly upon the influences of the gentle gas flow, the current of hot air, and the draught of the chimney upon the products of combustion.

As to the comparative duty of the "Chandler" burnerless lamp, we have no independent information. We can, however, vouch for its burning well with a good shaped flame, and its brilliancy as the result of recuperation is self-evident. It is claimed that the fact of the hottest part of the flame being at some distance from the actual end of the gas pipe is sufficient protection for the latter against undue waste or corrosion. In any case, the advantage of a lamp having no holes for gas smaller than will admit of a substantial rod for clearing out any deposit may be largely appreciated. The heat recuperator portion of the lamp is also of the simplest character and of most substantial construction. Altogether, the apparatus appears to be an addition of practical value to the fast increasing list of recuperative high power gas burners.—*Jour. of Gas Lighting.*

The Slide at Lake Zug.

On July 5, 1887, at the town of Zug, in Switzerland, a portion of the shore gave way and sank into the lake. About three hours later another much larger adjacent area also suddenly subsided, so that in all an area considerably over two acres, with half of one of the principal streets, was submerged to a depth of about 20 feet. It can be seen that the subsoil consists of coarse gravel and sand, followed after a few feet by soft, wet sand and fine mud. According to Professor Heim, this fine mud or sludge reaches to a depth of nearly 200 feet, and the disaster is shown to be due to a flowing out into the lake of this mobile sludge from under the superincumbent weight of buildings and firmer ground. The buildings collapsed as they sank. The catastrophe must have been long impending. The exact cause which precipitated it is undetermined, but a low level of the lake and tremors from pile driving for new quays are suggested as contributories.—*Geol. Mag., October*, 1887.

APPARATUS OF THE PARIS FIRE DEPARTMENT.

The steam fire engine used in Paris is of the Thirion type, and is always accompanied to a fire with a carriage that may be called its tender. This carriage (Fig. 1) carries 2,500 feet of hose, wound round two reels between the two hind wheels, a supply of coal, a number of hose couplings, and all the accessories of the engine.

Besides this, there is another carriage that serves for carrying quickly to a fire the first apparatus necessary and the men for maneuvering it. This carriage consists of a platform in front for an air pump and of a strong box behind for the reels. This box, which is surmounted by a chest and two benches, is supported by a cranked axle and two wheels of wider diameter than the ones in front. The horses are harnessed to whiffletrees, attached to a splinter bar, and the pole, being stationary, does not oscillate and thus fatigue the horses.

The carriage is provided with two hose reels and a pump, two scaling ladders, a life saving sack, a sliding ladder, a hook, and an air pump and fireproof suit, to allow of places being entered where the air is irrespirable. The carriage is provided also with a Trouve electric lamp, a miner's lamp, maps of Paris, and a memorandum book showing the location of the hydrants and the pressure and nature of the water at each. The carriage carries a foreman, three assistant foremen, twelve firemen and corporals, and a driver. Its total weight, when ready to go to a fire, is 7,313 pounds.

We do not present a figure of this carriage, since it looks so much like the tender shown in Fig. 1; but we must call attention to one of the most important apparatus that it carries, and that is the Paulin cellar-fire apparatus. This consists of a suit like that used by divers, which allows a fireman to enter a cellar in which the air has been rendered irrespirable by a conflagration. When it is a question of an ordinary fire, and the air of a room is filled with smoke, the firemen, by taking special precautions, manage to enter,

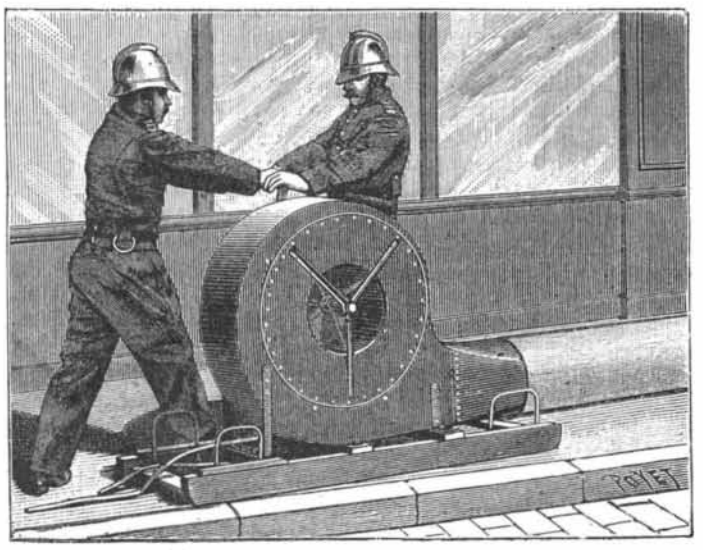

Fig. 3.—VENTILATOR.

but this cannot be done when a cellar is filled with illuminating gas or the products of combustion of sulphur, India rubber, and a number of other substances that furnish asphyxiating gases. In order to locate the fire in such a case, it is necessary to have recourse to the apparatus under consideration. The fireproof suit consists of a leather blouse, fastened at the waist and wrists with ligatures, and provided with a hood and iron mask. The air necessary for respiration is introduced through an aperture in the back of the suit, by means of a rubber tube of great length. The blouse is very roomy, and allows of great liberty of motion. Fig. 2 shows the method of using the apparatus. After the fireman has visited the room filled with deleterious gases, and has made known the seat of the fire, and the men have got the better of the latter, the air remains impregnated with gases that render the room inaccessible, and it becomes necessary to remove such gases, and substitute pure air for them. It is here that intervenes a new apparatus—a centrifugal force ventilator. This apparatus, which is carried on a push cart, consists of curved buckets which when set in motion suck in respirable air, and force it into a pipe of wide diameter that runs into the cellar. This ventilator discharges 14 cubic feet of air per second.

As the gases are generally hot and light, the air thus forced in easily replaces them. Were it a question of very dense gases, heavier than the air (carbonic acid gas for example), a special ventilator would be used, that of Enfer, which forces in air under pressure. As this apparatus is rarely used, we do not think it necessary to describe it.—*La Nature.*

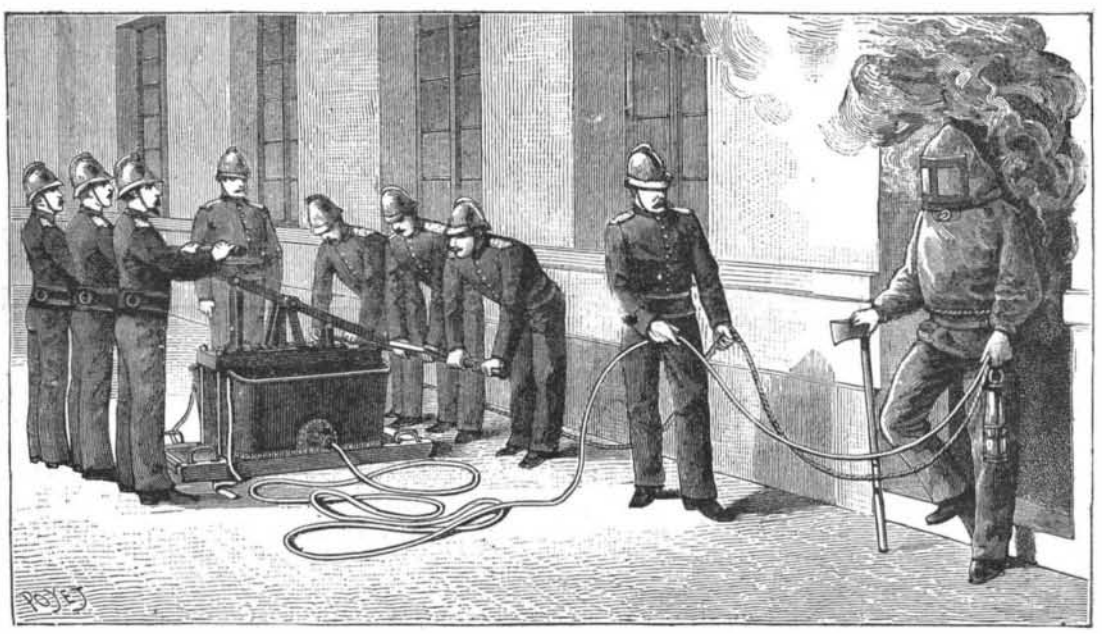

Fig. 2.—AIR PUMP AND FIREPROOF SUIT.

A CORRESPONDENT of the *Electrical Review* (London) furnishes the following table of the number of amperes required to fuse copper wires of various sizes:

B. W. G.	Amps.	B. W. G.	Amps.
30	21·84	36	7·72
32	19·25	40	4·58
34	15·44		

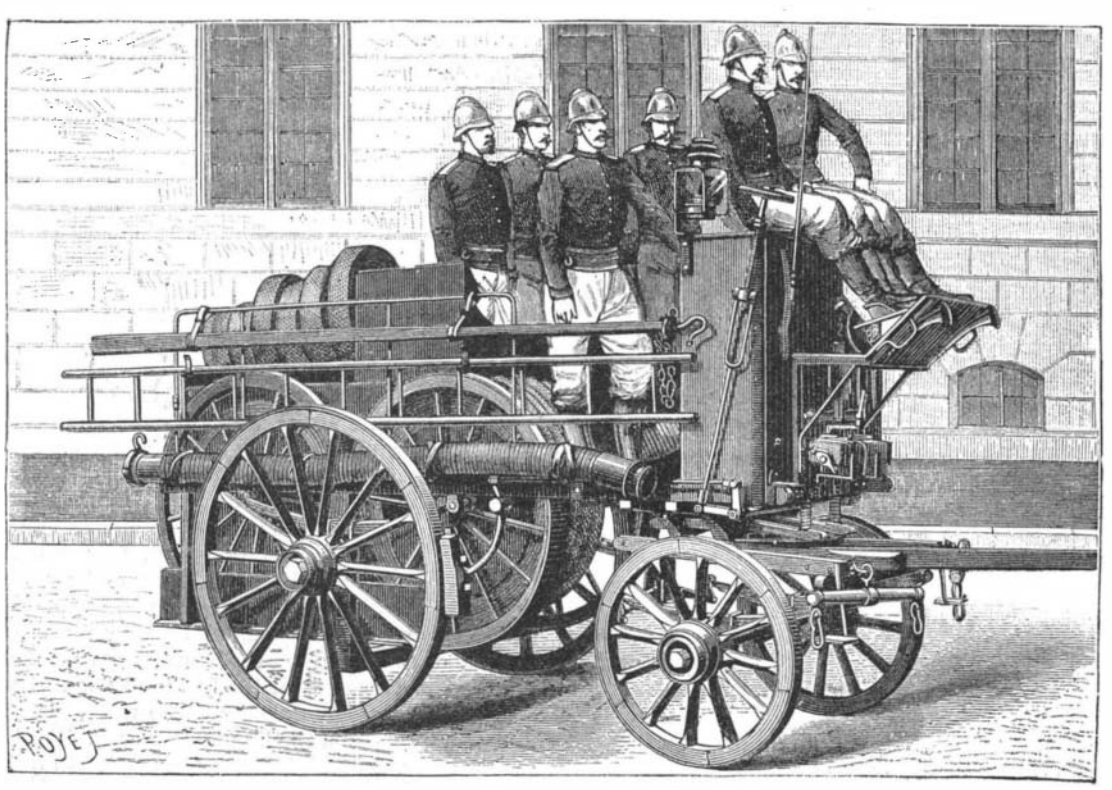

Fig. 1.—FIRE ENGINE TENDER.