

troduced with the ferment of urea into a solution of urea, into which dip sulphureted papers, it gives hydro-sulphate of ammonia.

The methods that we have just described have given very interesting results, and have shown that there exist, on an average, 80 bacteria to the cubic meter of air. The maximum occurs in autumn, and the minimum in winter. The average numbers are as follows:

December and January.....	50 bacteria.
February.....	33 "
May.....	150 "
June.....	50 "
October.....	170 "

Contrary to what occurs in moulds, the number of schizophytes, which is small during rainy weather, rises when all the dampness has disappeared from the surface of the soil.

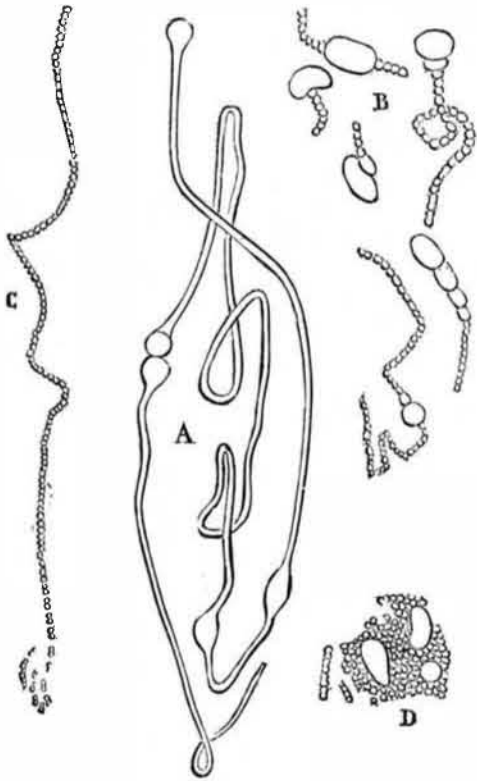


Fig. 10.

The action of dryness is greater than that of the temperature. It seems, in fact, as a result of numerous experiments, that the water evaporated from the surface of the soil never carries schizophytes with it. Dry dust, on the contrary, that from hospitals principally, is charged with microbes. As a result of comparative experiments made in Rue Rivoli, and at Montsouris, it appears that the air contains nine times as many bacteria in the interior of Paris as in the vicinity of the fortifications. The influence of the dominant winds is notable. That from the northwest reaches Mont-

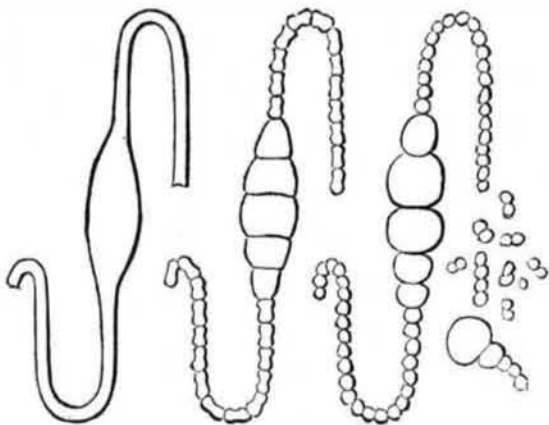


Fig. 11.

souris laden with a considerable number of bacteria. This is the wind that blows from the hills of La Villette and Belleville. Then come the winds from the east, north, and northwest. The south wind is less charged with these organisms. The distribution of microbes in a vertical direction indicates that they are derived from the mud and dirt of the streets and dwellings. A cubic meter of air, which contains but 28 of them at the summit of the Pantheon, contains 45 at the Park Montsouris and 462 at the Mayoralty of the fourth ward.

The determination, among these myriads of schizophytes of the air and water, as to which are the ones that intervene in contagious diseases is the final problem proposed to science, and the solution of which will be greatly aided by the work that is being done at the observatory under consideration.—*Le Génie Civil*.

A CORRESPONDENT of the *British Medical Journal* states that he has found the application of a strong solution of chromic acid three or four times, by means of a camel's hair pencil, to be the most efficient and easy method of removing warts. They become black and soon fall off.

#### FIRE AND BURGLAR PROOF SAFES.

The series of nine engravings on the first page are illustrations from sketches of the fire proof and burglar proof safe manufactory of Hollar's Safe and Lock Company, York, Pa. One of the views represents their factory, which was recently built and equipped with machinery and appliances specially designed for their business, and is not excelled by any other establishment for completeness of tools, fittings, and means of producing good work with facility and dispatch. The company have a frontage of 350 feet on the N. C. R. R., from which sidings run to the shops, enabling them to receive supplies direct and to ship finished work with the least possible delay.

The largest of the interior views represents the burglar proof department, so called, because that in it burglar proof safes and vaults are made. Many who are not fully informed on the subject believe that there is no possibility of constructing a burglar proof safe or vault, the belief being induced by published accounts of successful "crackings" of safes by professional burglars. It is probable, however, that investigation would show that the fault lies with those purchasers of safes who regard the price of the safe as of more consequence than its quality, and so encourage the manufacture of inferior and unreliable articles. These ideas would be modified and corrected by a visit to this factory and an inspection of the processes there employed to construct absolutely burglar proof safes and vaults.

These processes are the forming of solid welded angles and frames out of welded plates of chrome and carbon steel and iron; the thorough fitting of all joints by planing and grinding; the exactness of the preparation of the parts for the reception of the company's patented compound key wedges and conical and stub bolts for securing all the parts together as one body; the protection against the introduction of all explosives by the use of their patent ribbed tongues and grooves; the security of the door against the force of the most skillfully driven wedge; the means employed by the company for resisting screw power by their patented method of locking the bolt frames to the door, making it a part of the complete construction; the making, grinding, and building-in their patent lock arbor, that strengthens instead of weakens the door, which has heretofore been the weakest part of the construction. These methods, and intelligent effort in their application, have made it possible to construct a safe with no weak point, the door, always heretofore a point of weakness, being made equally invulnerable with all other portions of the safe or vault.

The facilities for heating, working, hardening, and tempering of steel are excellent. These processes may be seen in the view of the smiths' department, in which large furnaces, bending clamps, and cooling tanks are provided. The tanks are kept constantly supplied with cold, soft water procured from an artesian well, drilled for the purpose; and after all the various parts of the steel safe, vault, or section are completed, they are here treated to the tempering process that renders them proof against the drill or any known cutting device. Then follows the rebuilding of the safe, vault, or section, as the case may be, not again to be taken apart.

In another view is seen the department for the construction of the iron work essential in the production of the highest grade of fire-proof safes. In this department nothing is left undone that will aid to the desired end—that of absolute protection of records, books, papers, plate, jewelry, etc., from fire; for without a strong iron exterior and interior case to contain it and hold it securely, the best non-conducting material is useless. This has been demonstrated by many fires, in which strap or hoop front and back safes have been broken open by falling from a considerable height, or crushed by the weight of falling walls. In order to remedy this fatal weakness this company have introduced, in the construction of their fire-proof safes, solid welded angle fronts and backs, the doors being protected by a wrought iron tongue, which is made to fit neatly into a corresponding groove in the door jamb on all sides.

In the center view is seen the final process of grinding the surfaces of the safes, with traversing emery wheels, as they progress to the filling room, shown in the view to the right. In this room the important process of preparing and mixing the fire-resisting materials is performed. Filled with this substance the hottest fire can never force its heat through the walls of the safe to the injury of the contents. This material is mixed with fifty per cent of water, and thus mixed has the quality of rapidly attaining the solidity of stone with its burden of water sealed within it, ready, in case of fire, to be liberated in the form of vapor, which, pervading the whole interior, prevents the destruction of the contents of the safe.

During the process of fire-proofing an expert examines every part of the work and all the materials used, before the safe is approved and declared ready for the reception of the cabinet work, which is prepared in another department shown in a view on the right. The safe is then ready for the paint-room, seen in another view. Here it receives treatment at the hands of a competent artist, and when finished may be justly pronounced a thing of security and beauty.

The company have a capacity of twenty complete safes a day besides jail and other work. Only the best of materials and the best of workmanship are used and employed—the company make no claim to cheap, second-class work. The most skillful workmen are employed, having been gathered from those localities where the best grade of safe work has been hitherto produced.

Mr. William H. Hollar, the founder and able president and manager of the company, is a gentleman well qualified for the responsible position he occupies, having had years of experience in the business and fully understanding all its requirements. He has able assistants in every department, and a number of the directors and principal stockholders represent much of the wealth and enterprise of a progressive and important community.

#### RECENT DECISIONS RELATING TO PATENTS. By the Supreme Court of the United States.

Reissue Letters Patent No. 6,673 granted to Mrs. P. Duff, E. A. Kitzmiller, and R. P. Duff, October 5, 1875, for an improvement in washboards, on the surrender of original letters patent No. 111,585, granted to Westly Todd, as inventor, February 7, 1871, are not infringed by a washboard constructed in accordance with the description contained in letters patent No. 171,568, granted to Aaron J. Hull, December 28, 1875.

In view of prior inventions, the claims of the Todd patent must be limited to the form shown—namely, projections bounded by crossing horizontal and vertical grooves—and do not cover diamond-shaped projections bounded by crossing diagonal grooves.

In the field of washboards made of sheet metal, with the surface broken into protuberances formed of the body of the metal, so as to make a rasping surface and to strengthen the metal by its shape, and to provide channels for the water to run off, Todd was not a pioneer, but merely devised a new form to accomplish those results; and his patent does not cover a form which is a substantial departure from his.

Letters patent granted to Edwin L. Brady, December 17, 1867, for an improved dredge boat for excavating rivers, declared to be invalid for want of novelty and invention.

The design of the patent laws is to reward those who make some substantial discovery or invention which adds to our knowledge and makes a step in advance in the useful arts. It was never their object to grant a monopoly for every trifling device, every shadow of a shade of an idea, which would naturally and spontaneously occur to any skilled mechanic or operator in the ordinary progress of manufactures.

Although a patent is not set up by way of defense in an answer, yet if the invention patented thereby is afterward put into actual use, the date of the patent will be evidence of the date of the invention on a question of priority between different parties.

One person receiving from another a full and accurate description of a useful improvement cannot appropriate it to himself, and a patent obtained by him therefore will be void.

#### By the Court of Claims of the United States.

The language of the Constitution confers upon Congress the power of "securing to inventors the exclusive right to their discoveries." It is not empowered to grant to inventors a favor, but to secure to them a right; and the term "to secure a right" by no possible implication carries with it the opposite power of destroying the right, in whole or in part, by appropriating it to the purposes of the Government, without complying with that other condition of the Constitution, the making of "just compensation."

Neither does the term "the exclusive right" admit of an implication that, with regard to such patentable articles as the Government may need, the right shall not be exclusive.

Such right, when properly secured in the manner provided by law, becomes property in the eye of the law, and the Government cannot make use of the improvement any more than a private individual without license of the inventor or making him compensation.

Where, as in this case, there is clearly an implied contract between the Government and the citizen, and the suit is brought entirely upon that agreement, and the claimant is without judicial redress elsewhere, the Court of Claims of the United States has exclusive jurisdiction.

The above decision has been confirmed by the Supreme Court of the United States.

#### By various Circuit Courts of the United States.

A licensee is at liberty to contest the question whether the articles made by him embody the invention or any material part thereof, and a stipulation to the contrary in the contract is of no effect.

In a suit by a patentee against a licensee for license fees for the use of a patented improvement, something corresponding to an eviction of the licensee must be pleaded and proved if he would defend against an action for royalties.

Where plaintiff's claim must be construed as a "shortened vamp"—that is, a vamp which ends substantially where the box toe begins—as a means of uniting the box-toe and tip to the upper, and defendant's vamp is carried for the full length over the toe and lasted with the sole, *Held* that there was no use of plaintiff's invention.

A mere license to make and use, without the right to grant to others to make and use, the thing patented, though exclusive, will not authorize the licensee to bring suit in his own name for infringement without joining the patentee. *Semble*, if the patentee refuses to join, a court of equity can give a remedy to the licensee.

Where a manufacturing company and a firm entered into a contract by which the former let out to the latter all the power, machinery, etc., of the company, to be used for the manufacture of tools, and for carrying on the business of

the company agreed to be done by the latter parties in co-operation with the directors, the firm agreeing to pay as rent ten per cent of their net sales, the profits of the consolidated company to be shared in certain proportions, *Held*, that the manufacturing company are not responsible for the manufacture of try-squares complained of, made by the firm for its own use in the rented premises.

May a landlord be enjoined from permitting his tools and machinery to be used for the injury of a third person? *Quere.*

An improvement in try squares which produces a tool more convenient, with a larger capacity, and more accurate, by adding to such a tool a slot in one of the arms, is a patentable invention.

Whether a reissue is wholly valid or not, it may be valid to the extent that claims in the original and in the reissue are alike; and if those claims are infringed, an injunction may be granted.

The reissued patent of John Lovatt, May 30, 1876, being much broader than the original, declared void.

The right to have corrections made by reissue may be abandoned and lost by unreasonable delay.

A reissued patent which enlarges an original patent—*i. e.*, which makes the invention patented other and more inclusive than the original letters patent—is void as against intervening rights and the public as well.

The object of the law on the subject of patents is to advance the interest of the public by securing certain exclusive rights to patentees, and among those rights is that of changing, by a surrender or reissue, the language when the idea remains the same.

Reissued Letters Patent No. 8,590, granted February 18, 1879, to Charles T. Day, for an improvement in skates, construed and *Held* not to be anticipated by the invention patented June 22, 1869, by Alpheus S. Hunter.

Reissued Letters Patent No. 6,811, granted to John Parker, December 21, 1875, for an improvement in fly-traps, examined and held to be invalid. Reissued Letters Patent No. 6,493, granted to James M. Harper, June 22, 1875, for an improvement in fly-traps, construed and *Held* not to be infringed by the defendant's structure.

In the fly-trap whose construction is otherwise old it is not a patentable invention to strengthen the wire-cloth case by the use of upright and horizontal stays, nor to similarly strengthen the wire cone by annular and upright stays. These are suggestions which would occur to any skilled mechanic in constructing such chambers of wire-cloth, from the very nature of the material, and are mere matters of workmanship involving no invention.

There is no patentable invention in fastening the cone of a fly-trap to the base by slipping the horizontal annular stay of the former within that of the latter, so that they shall coincide, nor in nesting such cones for transportation.

The damages recovered in a suit for infringement are merely a satisfaction for prior use, and do not free the parties infringing from the operation of a patent.

The use of part of an invention covered by a patent may constitute an infringement, and a party so using an invention after injunction granted adjudged guilty of contempt.

Where skates containing an improvement on an earlier patent held by the same inventor were in use or were offered for sale by the same inventor, whether actually sold or not, more than two years before his application for his second or subordinate patent, the latter is void.

The decision of the Patent Office upon an interference proceeding is sufficient to entitle the successful party, as against the defeated party or his privies, to a preliminary injunction upon the question of priority of invention.

The defeated party may, in another action, raise the question of want of novelty in the invention; yet if he had knowledge of the state of the art at the time he made his application, the want of novelty must be made clearly apparent.

Letters Patent No. 259,597, granted to Stephen N. Smith, June 13, 1882, for an improvement in machines for making lacing-books for shoes, construed and *Held* not to be anticipated by Letters Patent No. 102,195, granted April 19, 1870, to S. W. Young, or by Reissued Letters Patent No. 9,837, to Lauriston Towne, August 9, 1881.

Letters Patent No. 177,334, granted to Abner B. Hutchins, May 16, 1876, for an improvement in hydrocarbon-stoves, examined. The court declined to consider whether the invention was sufficiently described in a prior Canadian patent, or whether the invention had been in public use for more than two years prior to filing the application, it appearing that the defendants' structure did not infringe the claim of the patent.

Disclaimers, qualifications, and limitations imposed upon a patentee by the Patent Office are forever binding upon him, if he chooses to accept a patent containing them, and they forbid any subsequent enlargement, whether by reissue or by a broad construction of claims thus intended to be limited.

If an applicant considers a case important enough, he may refuse to take a limited patent, and being then rejected, may apply to the Supreme Court of the District of Columbia, and if still dissatisfied, he has his remedy in equity by section 4,515 Revised Statutes. Here remedies are ample, and they are exclusive under the decisions.

Construing the patent according to the requirements of the Office acquiesced in by the patentee, *Held* that the defendant did not infringe, because his frame has not the peculiar construction which the Examiner declared was the only ground for issuing the patent.

## Correspondence.

## The Statue of Liberty.

To the Editor of the Scientific American:

In your last number is a plan that must meet the approval of all concerned to raise the statue of Liberty, by building it on its great plinth stone; and by powerful screws raising it by degrees to its desired height. But the almost brick-work like pedestal seems out of proportion in its plainness to the statue.

It seems to me that a column, not unlike Pompey's pillar, in Egypt, or a minaret tower, might be designed, that would be far more beautiful, or even some square Italian tower. If the design, in the poverty of the people of the United States, is to build this rude, unseemly pedestal, to be inclosed hereafter in cut and ornamental stone, then there is no objection to it; for it will remind our citizens of the great want of money, that built up so many millionaires. Of course other means of giving the statue stability might be adopted than the central metallic tube, as the statue is evidently designed to be fitted with braced work of metal, and then filled with masonry, with a winding stone staircase to its top. But the mode of its elevation by the plan suggested, it seems to me, is eminently practical.

S. J. PARKER.

Ithaca, N. Y., May 25, 1883.

## "Hydrophobia."

To the Editor of the Scientific American:

Working as a boy in the office of the *American Farmer*, Baltimore, Md., I first became familiar with your paper a quarter of a century ago, and it has afforded me boundless pleasure and profit since. In your issue of March 31, article entitled "Treatment for Snake Bites and Hydrophobia," credited to the *Lancet*, I find the following, and if permitted expect to show another illustration of the old adage, "There is no new thing under the sun." "At a recent meeting of the Lower Rhenish Philosophical and Medical Association, held at Bonn, Professor Binz described an interesting series of experiments carried on under his direction, with a view of testing various antidotes to the poison of serpents. He remarked that numerous specifics are heard of among the natives of India, which as a rule were inoperative. His opinion was that when a poisonous snake has bitten a person in the usual manner, spirits can only serve to alleviate or prevent the spasms of suffocation which are induced by the action of the poison on the respiratory nerves. Atropine and other specifics against imminent results of an analogous character caused by narcotic influences, have been found ineffective against this deadly virus. The most favorable tests made were with *chloride of lime*, a filtered solution of which was injected into the place where the fatal virus had previously been introduced. In seventeen trials made in succession, the poisoned animal survived without the slightest disturbance of its healthy condition. In five succeeding experiments, when a relatively insufficient dose was administered, or when animals suffering from disease were operated upon, the chloride of lime served only to retard the fatal effects of the poison. Binz suggested that the adoption of this treatment in cases of the bites of dogs suffering from rabies might possibly be attended with favorable results, inasmuch as chloride of lime has been shown to have much greater power than any of the caustic substances now usually applied to dog bites, which have been proved to be scarcely if at all effective against the consequences of snake bites."

Chloride of sodium, common table salt, chemically a combination of *chlorine* and sodium, universally used as a condiment and antiseptic, and highly recommended in malarial fevers, has recently come to the front as a remedy for hydrophobia; and the letter upon the subject in the April issue of the *Druggists Circular*, by Dr. Dix, of Shelbyville, Ky., merits the attention of the medical profession as well as laymen.

I have in possession some curious instances of the use of chloride of sodium as an internal remedy for hydrophobia, in Maryland, extending back full half a century. My collection of cases where it has been given internally, added to Dr. Dix's experiments and experience applied to the wound externally, would justify further experiment by students of science, particularly, since in addition to the "chlorine" afforded as a decomposer of the animal virus or poison in the circulation are the well known therapeutic effects of salt entering rapidly into the blood and thrown off by the kidneys, acting upon the bowels, tonic and stimulating to the general system. In teaspoonful doses it is widely used as a household remedy to lessen the rapidity of the circulation and stop the flow of blood. Dr. Dix recommends opium for this purpose; the small amount necessary to produce narcotic effects would make its general use, however good, to some extent dangerous, given under circumstances of intense excitement.

Prof. Binz's suggestion that chloride of lime would be a valuable remedy for the cure of hydrophobia, applied to the wound, is not quite "as old as the hills," but old nevertheless. Why it did not occur to him to use it hypodermically and by mouth, and to others also, I cannot understand. It is stimulant and astringent, in the first case helping to raise the vital powers, and in the second case lessening the rapidity of the circulation, and retarding the dissemination of the poison through the economy. If chloride of lime applied to the wound will decompose the veins with which it comes

in contact, it is reasonable to assume, that some of it will be absorbed by the vessels and decompose the virus in the circulation. If this is a fair assumption, it is plausible, practicable, and possible to meet the poison within the system and destroy it. To show the antiquity of the remedy, I append the extracts taken from a letter of Dr. Jos. Ennals Muse, of Cambridge, Md., written for the *Cambridge Chronicle*, February 18, 1830:

"With this view and these sentiments I make the communication of a 'fact' which should be cut out and pasted in every man's parlor. The fact I allude to has been recently ascertained by a French chemist and surgeon, M. Coster, and published in the *American Journal of Science*, conducted by Professor Silliman. This important fact, 'that chlorine has the power to decompose and destroy the deadly poison of the saliva of the mad dog!' has grown out of chemical philosophy and chemical research, and is of more value than vaccination, or any other discovery which the annals of medicine have recorded; because it furnishes man with a certain prophylactic against the most horrible disaster which is incident to his existence.

"Of the truth of this discovery and the accuracy of the experiments on which the statement is predicated, there can be no doubt, 'it is affirmed,' by the most highly valued medical authority; and M. Gay Lussac has since reported a case of the successful application of the same substance to poison by prussic acid, one of the most active and virulent known in nature; and it will probably be extended to many others. It is astonishing that this substance called, 'chlorine' under the new nomenclature, should have remained so long comparatively at rest. It was discovered by Schle in 1774, and was used many years ago by England, and I believe France, to purify their ships, jails, and hospitals, under the name of 'oxy-muriatic gas.' The principle, too, on which it operated was then well understood; and the theory now differs in the present case, chiefly in terms. Hydrogen gas is known to constitute, in combination with sulphur, phosphorus, and ammonia, the intolerable smells from putrefying substances; deprived of hydrogen this odor disappears; the analogy was extended to animal effluvia; the conclusion was drawn that the abstraction of the hydrogen by means of its affinity for the excess of oxygen in the oxy-muriatic gas would destroy the virus by its decomposition; the result has been satisfactory. The Chloridians view this same oxy-muriatic gas as an elementary substance, and call it 'chlorine' from its green color; this 'chlorine' then performs the part of the oxygen of the 'French theory,' and combining with the hydrogen of the effluvia effects its decomposition, and consequent destruction, in the same manner.

"As many poisons (most probably all animal poisons) are known to contain hydrogen, it is a matter of astonishment that analogical induction had not long ago advanced the learned inquiries to the present important discovery, 'that poisons, animal and mineral, constituted in part of hydrogen, as far as experiment has gone, are decomposed and rendered innocent by oxy-muriatic gas, or chlorine, as the respected theorists may please to have it.'

"This article (chlorine) is cheap, and should, in conjunction with the mode of using it, be in the possession of every family, because delay will render it abortive. It is prepared and applied in the following manner: Make a strong wash, by dissolving two tablespoonfuls of chloruret of lime in half a pint of water, and instantly and repeatedly bathe the part bitten. The poison will in this way be decomposed. It has proved successful when applied within six hours after the animal has been bitten.

"It may be now proper to say that I have made this communication, because the fact stated is one of recent discovery: and I have made it the more full, connecting with it the rationale, that it may obtain the greater confidence with those who, though not conversant with chemical science, yet can appreciate the force of reason in any science; and I have affixed my name, because an anonymous notice of a fact does not necessarily bear with it the verity or responsibility of a name.

"I have the honor to be, sir, Yours, etc.,

"JOSEPH E. MUSE."

Hoping this letter will serve to invite the attention of scientific men to experimental investigations relating to the internal use of chloride of sodium and chloride of lime, in addition to the already highly extolled external use of these substances, and that they will prove satisfactory substitutes for the present barbarous and unscientific knife and actual cautery—if the poison is on or near the surface of the wound, these substances will destroy it; if it is absorbed, they may extract it or neutralize it; the knife and cautery can do no more on the surface, and nothing but injury if the poison is absorbed.

J. M. WORTHINGTON, M.D.

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## Explosion of a Slag Ball.

The *Ironmonger* relates an account of an accident of an alarming character which recently occurred at South Bank, Middlesborough. Near the railway station, says our London contemporary, is the slag heap of the Cargo Fleet Ironworks. A large slag ball had been taken from one of the furnaces and tipped over the slag heap, when it exploded. Three large pieces of the molten slag fell through the roof of the railway station on to the platform, and several passengers awaiting the train to Middlesborough narrowly escaped being injured.