

Curious Stories About Dynamite and Effects of Reckless Handling

AFTER a dynamite explosion there is seldom much left to determine the cause. The United States, unlike the governments of Europe, has made little effort to collect statistics upon this subject, but those that have been collected indicate that almost all the accidents from the use of high explosives are due to carelessness in handling.

The carelessness of men who handle dynamite is proverbial. "As careless as a powder monkey" is a phrase that describes a well established condition. The experience of a Jersey City inspector is not unusual.

On entering a small shanty where this inspector thought dynamite was being kept

intoxicated persons shall be permitted on the site is not allowed.

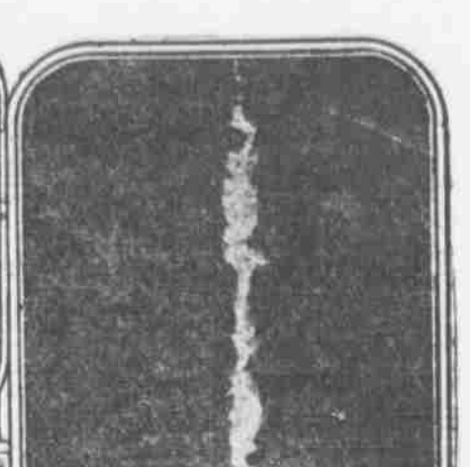
"Then his sense of economy got the better of him and when the next one caught fire he attempted to stamp out the flames with his boot heel, strange as it may seem, that fellow received after a month in the hospital and only lost one leg by his experience.

"In extensive works like this tunnel excavation there have been several plans for thawing dynamite. The most common home-made tray house is a box with a steam coil on the floor, over which the dynamite is supported on slats.

"This method offered an excellent opportunity for nitroglycerine to explode if the temperature is



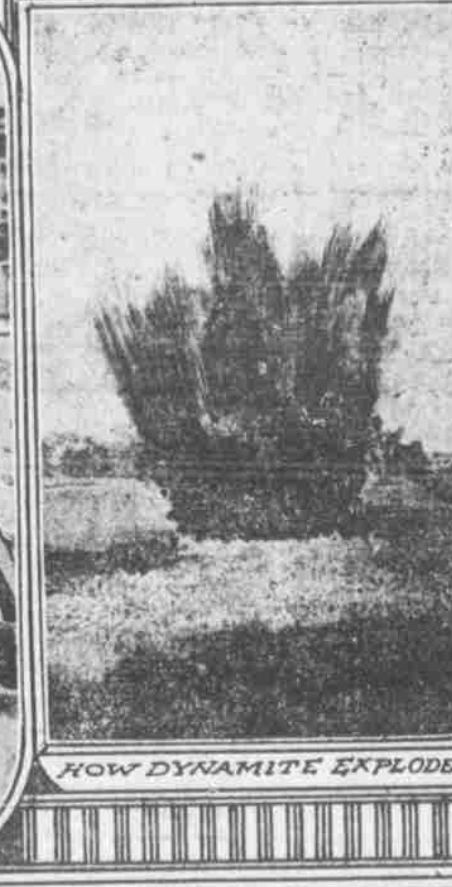
LOADING SAILING VESSEL WITH DYNAMITE.



A SUBMARINE BLAST.



DYNAMITE EXCAVATING HOUSE PENNSYLVANIA RAILWAY TUNNEL EXCAVATION.



HOW DYNAMITE EXPLODES.



HOW DYNAMITE IS THAWED IN THE COUNTRY.

found a negro stretched out sound asleep on a bench, with a dozen men and boys shooting craps around a table. Right beside them on a hot radiator were a dozen sticks of dynamite, thawing, while over their heads was stored 400 pounds more.

Another inspector came on a man breaking open a box of gelatine compound, and more powerful than dynamite, with his boot heel. Had his heel gone a fraction of an inch too far into the box there would have been an explosion which would have killed him and left a hole in the ground big enough to bury a horse.

A third inspector, at Kimberley, South Africa, saw one of the Kaffir watchmen sitting in the shade of the corrugated iron magazine smoking a pipe. He had been repeatedly warned that smoking was contrary to orders and the officer beckoned to him. Before the Kaffir could rise there was an explosion of 75,000 pounds of high explosives and 25,000 pounds of gunpowder. A spark from the pipe had ignited some powder which had leaked out through a crack in the house.

Inspector Wolf of the bureau of combustibles says that all the recent accidents in New York and its vicinity were undoubtedly due to the carelessness of those in authority did not prepare rules providing proper precautions, but to the carelessness of workmen.

"There are no doubt places in which high explosives are stored in amounts in excess of that allowed by the law," Inspector Wolf continues. "I have been sending laws and notices in investigating places in which such violations have been reported.

"But so long as building operations continue in their present magnitude, and the demands for excavations are as great, the law, as it at present exists, is inadequate. Especially is this true during the winter months, when a larger quantity of the explosive is required in order that it may be thawed for use. Frozen dynamite, you know, is ineffective, and being practically nonexplosive, is much less dangerous to have in bulk in the city.

"In spite of the immense quantities of dynamite that has been used in recent years, New York has been comparatively free from disastrous accidents. The most serious of all was that on Park avenue near the Murray Hill Hotel in January, 1882, during the construction of the subway. This, it is believed, was caused by the making of primers in the thawing house, combined with a fire in the waste paper from the wrappers around the explosives."

Mr. Wolf said that there had been no official statistics preserved of the accidents in the city and their causes, and that the bureau depended for information in this respect almost entirely on newspaper clippings. In this country there is little, if any, government or state inspection of explosive factories analogous to that in Great Britain.

In European countries rules governing the manufacture, transportation and storage of the dangerous products are made by the different governments, and an employee who violates these laws is not only discharged, but fined and often imprisoned as well. The methods of thawing dynamite and other nitroglycerine explosives are specified by law and infractions are punished by the courts.

Magazines for storage are examined by government inspectors and licenses issued before they can be used. Even the keys to magazines must be given to responsible persons, whose sole duty is to look after explosives. In Great Britain the law even specifies that an employee of a factory making explosives must be provided with clothing made of noninflammable material and having no pockets.

A reserve supply of high explosives is kept by manufacturers and big contractors in barges in the lower bay, while at Iona Island up the Hudson, below West Point, is a government magazine. Each morning the day's supply is brought to the city in barges and this little fleet, well known to all river men by the red flags they fly, has a right of way that no one attempts to dispute.

The explosives are transported from the pier through the streets in a wagon, which, according to the regulations of the city, must have painted on it "In easily legible letters, at least six inches high, 'Powder Wagon' on sides and back." The driver must hold a certificate of fitness; no vehicle, and smoking within ten feet of it

find some new and startling trait. As this discovery is generally made at the cost of an explosion that wrecks the building, its value is a problem that is left for the investigator who follows.

One of the earlier Du Ponts while showing some army officers through the plant in Delaware was killed in one of the retort rooms. A man who had been in the room but a few minutes before the explosion said that the mass of nitroglycerine was boiling and bubbling the way that, according to all precedents, it should. But something happened in a minute, or perhaps a second, that brought instant death and destruction.

While a fire which destroyed a pier in Hoboken in May, 1901, was in progress a carload of dynamite was pulled out, a mass of flames. It was rushed, blazing fiercely back into the yards, water was turned on, and flames were extinguished. There was no explosion.

Yet a spark from a passing locomotive falling into a brush heap against a magazine at the Laguna Dam, Ariz., caused an explosion in which 1,000 pounds of powder and dynamite were exploded, causing great damage to property and serious injury to many persons.

A powder wagon containing 1,000 pounds of dynamite was struck by a passenger train at a crossing near St. Louis, Mo. The wagon was demolished, the mule attached to it was killed and dynamite was scattered all over the right-of-way. But there was no explosion.

At Jellico, Tenn., fifteen persons were said to have been killed and many injured by the explosion of a car of dynamite. An investigation showed that the car had been shot into by a person using one of the powder cards as a target.

Shooting into dynamite seems to be one of the sure and certain ways of causing an explosion. The records are full of accounts of catastrophes caused by ignorant people shooting at the magazines.

The explosion of three cars of dynamite at Johannesburg, South Africa, in which a score of people were killed, was laid to a stray bullet. Boys shooting into old buildings that were formerly used for storing explosives have on several occasions been credited with lessening the train population.

The desire of all experimenters in high explosives is to make one that shall have great power and also be safe for those who must handle it. Some compounds of nitroglycerine are said to withstand even the shooting test and also the test of having a red hot iron pushed through them.

"Winter is the open season for dynamite explosions," said one of the men who had charge of a thawing house at the Pennsylvania tunnel excavation. "Dynamite freezes at a temperature between 45 and 50 degrees Fahrenheit, and if you want to do anything with it you must get it back to its summer temperature.

"This is not as easy as it sounds, for it is no small matter to get the tricky stuff just warm enough and not too warm. It must be just warm enough in order to gain its full efficiency, while if it gets too warm it will become efficient in entirely too short order.

"We read in the papers that somewhere over in the coal mines of Pennsylvania a nuber's but has been blown up. It is ten to one that fellow had put a stick of dynamite on the kitchen stove to thaw it out, and had gone away and forgotten it; or else he had left it underneath the stove and the baby had got it and made a plaything of it.

"Out in the West in constructing roads and building tunnels the workmen often set the sticks up along a roadside to dry in the sun. The method is good enough if the sticks do not fall against each other, or if some one does not fire off a gun near by. If either of these things should happen the chances are there will be a big hole in the ground and an opening for another powder monkey.

"If the sun is not hot enough they generally build a fire near by and expect the warmth of the flames to put life into the dynamite. But if a spark happens to shoot over into the bunch it not infrequently has a sudden and startling result.

"I remember one case where an Italian was left to watch some dynamite drying thus and the boss had told him that if a spark ignited one of the sticks to pick it up and hurl it away as far as possible.

cartridge exploded, doing almost as much damage to the man as to the dog.

"But nitroglycerine is a queer stuff, anyway. About the only thing that I have learned for sure about it after being around the works where it is made is that it blows out the walls of buildings when it explodes, while the powder blows off the roof.

"For that reason you will find around a nitroglycerine house an earthwork that makes it look like a small fortress. Whenever there is an explosion you can look over the walls of this rampart and about all that you can see of what was there before is a lot of kindling wood piled up somewhat recklessly in the center of the space.

"People who work with the dangerous stuff seem to get mighty careless in its use. I remember of a gang of workmen over in New Jersey who were playing cards at a table where one of the legs was too short.

"One of the fellows thought to remedy this by putting a piece of dynamite, which was the most convenient thing at hand, under it. It was all right until the discussion became heated and they began to pound on the table. When the smoke cleared away there were several missing arms and legs and other portions of anatomy.

"Grumpiness is the worst fault of these workers. Whenever a man gets grumpy the boat takes that can happen to him is to get fired. Just out of pure cussedness you will find that fellow beginning to bring knives and pieces of metal into the works

in strict violation of orders. Just as likely as not you will find him hiding about himself a pipe and matches and at noontime he will be out smoking under a tree talking to himself.

"I don't know just why this is. It is certainly not caused by nervous strain, for these men working every day in the greatest danger, apparently have no idea of fear as the ordinary person understands it. On the other hand, a man who is dally exposed to peril in his work in the factory will go all in sleep over some perfectly absurd thing outside.

"This last winter on a ferryboat crossing the Delaware were a number of people employed in the nitroglycerine works. The boat got stuck in the ice and most of the passengers got off without much remonstrance and walked to the shore. But every one of those nitroglycerine workmen was afraid to leave the boat, and they spent part of the night there rather than take the risk of going over the ice.

"A big fellow who carries cartridges of giant gelatine down into submarine works, which most anybody would consider as the most dangerous employment in the world, was down at one of the nitroglycerine factories. He wanted to see, he said, how the stuff that he handled was made.

"After he had been through the plant he went up to one of the workmen and said: "How much do you get a day here?"

"Two dollars and a half," was the reply.

"Why, I wouldn't stay around here another day for \$250,000," said the big fellow, and he went happily back to his gelatine toting."

Progress of Application in the Field of Electricity

Electrical Trains in New York.

for steam locomotives on the Harlem division of the New York Central railroad became a fixed fact last week. At present the electric division of thirteen miles extends from the Grand Central station to Wakefield. All passenger trains, 12 in number, discard locomotives at Wakefield and are drawn to and from the station by electric motors. Eventually the electric zone will extend thirty-five miles on the Hudson river division and forty miles on the Harlem division. Two large power houses, one at Mount Morris and the other at Yonkers, were provided for, each to have 18-horse power capacity, with eight substations. The third-rail system was adopted.

On the original estimate the cost of the work was about \$50,000,000, although part of this was for an enlargement of the Grand Central station and the terminals. Great as the expense was, many railroad men believed there would be quick return from this investment, for the officials declared they could run the suburban trains on a two-minute schedule, and it was believed that the suburban business under these circumstances would be larger than any railroad had ever attempted to handle.

The decrease of steam operation has brought about greatly improved conditions in the yards and tunnels, the company has been able to retire worn out locomotives for repair, and electric operation has cut down the running time of local trains several minutes.

Uses of Small Motors.

Each year the small electric motor finds new tasks to do, until now almost everything about the house, office or shop which requires small power is operated with a motor wherever electricity is available. The different kinds of work which are required of these motors every day are past all attempts at cataloging and more extensive than anyone not connected with the business would imagine. The demand for a small self-starting motor which is thoroughly reliable and can be had at a small cost has been met by the production of a so-called split-phase motor. The expense of running these motors is very slight, as they use current only in proportion to the work done, and best of all, they require little if any attention. In the home the fans, sewing machine, washing machine, meat choppers, ash sifters, massage rolls, lawn mowers, carpet sweepers, grinders and

buffers, ice cream freezer, dish washers, bread mixers, dumb elevators, are all driven by the electric motor, if desired. The convenience of electrical power in the household has long been recognized and the use of small motors has become practically a necessity.

Besides the various household uses to which the motors are adapted they can be used to saw wood, cut the emulsion, cut and elevate the silo, pump water, separate the cream and churn, in the repair shop, for grinding chicken feed, supplying power for cider presses, corn shellers, bottle cleaners, milking machines and a dozen other things.

Artisans, such as jewelers, tailors, tin-smiths, locksmiths, dentists, tinkers, printers, carpenters and machinists make practical use of the motor in their work. In the machine shops the lathes, drills, emery wheels and grinders, drill presses, boring mills, etc., are all motor driven. The carpenter uses the power to run his small saws, shapers, grinders and planers.

Among the many novelties in motor driven machines are the floor planers and waxing brushes for use in large halls, the motor driven vacuum curry comb for horses and cattle, the shoe blacking machine, the stamp canceller for postoffice work, an automatic engine stop to prevent steam engines from running away in case the load is suddenly removed, air compressors for barber shops, air pumps, automatic musical instruments, adding machines, revolving signs, cone cutters, exercising machines, hat cleaners, coffee grinders, horseradish graters, candy pullers, ice crushers, coal carriers, motor vacuum combs and a large variety of small special machinery.

The motors range in size from one which can be carried in the vest pocket to a five-horsepower machine.

Wireless Telegraphy Feats.

Officers of the steamship Kaiser Wilhelm II tell a story which possibly may have a special significance. This vessel is provided with an outfit for wireless telegraphy whose range was supposed to be only about 30 miles. It has been noticed, however, that messages can occasionally be exchanged with ships or land stations two or three times as far away, and at least twice this winter the Caronia was successfully reached when between 1,000 and 1,200 miles distant.

A remarkable, if not an equally extreme,

variability in the apparent efficiency of Hertz wave apparatus has been repeatedly observed before. Rear Admiral Brownson's flagship, the West Virginia, furnished an illustration of the phenomenon when it was bringing President Roosevelt home from New Orleans a year ago last autumn. It is doubtful whether under ordinary circumstances the cruiser could send intelligible signals more than 300, or at the utmost, 500 miles. Yet while it was in the Gulf of Mexico dispatches which were meant for Key West were picked up at Norfolk, Washington and even in Kansas! Though no harm resulted from the occurrence, they reached a number of ears for which they were not intended.

For some of the inequalities in the range of a particular transmitter adequate explanations have been found, reports the New York Tribune. One type of receiving instrument is more sensitive than another, and hence will respond at a greater distance from the source of the wave impulses. Again, the degree of resistance to the ether waves which is offered by the atmosphere varies. Sometimes an effect is produced like the obstruction to ordinary light that is presented by dust or thin fog. It appears to be independent, too, of the paralyzing influence of direct sunlight.

Still another supposition has been advanced to account for the experience of the Kaiser Wilhelm II. It is briefly mentioned in the Engineering Supplement of the London Times, but without any clear indication of its origin. The opinion is expressed that in certain localities at sea a transmitter will work better than it will elsewhere. The North German Lloyd ship was "ether off" the Dutch coast or near the banks of Newfoundland when it secured its best results, and the conclusion is entertained that a relation exists between some atmospheric conditions in those places and the efficiency of the instrument. Well, if such be the case, it is strange that the theory has not obtained currency sooner. Operators on other steamships than the Kaiser have had the opportunity to discover whether any other to wireless telegraphic communication, but they have consistently failed to observe anything of the kind. If a remnant peculiarly like that under discussion really exists it is reasonable to think that it would have been detected years ago. Until convincing evidence to the contrary is afforded, therefore, it will be safe to assume that the Kaiser's position and the

enough, Mr. Garland had three persons join hands and one of them took hold of the other's lamp. When the switch was again turned he found that it produced a perceptible increase in the intensity of the light.

Hitching Sun to Electric Motors.

Electric power from sunlight appears more wonderful than harnessing the streams or wind. Yet we know something of the vast heat of the sun.

Solar engines for operating pumps have been in use in different parts of the earth for several years now, and their value in warm climates, where the number of days of clear sunshine averages high, must steadily increase. One of the most successful of these solar machines, says a writer in St. Nicholas, is located near Los Angeles to irrigate fruit land. An automatic stand carrying great reflectors follows the course of the sun as regularly as the best telescope ever made, and the sun's rays are thus reflected on a central point, where the boiler of a small engine is located. Within an hour after sunrise the heat of the sun raises the temperature of the water to the boiling point, and thus creates steam; and the pumping machinery begins its day's work and keeps it up until sundown.

The power of the sun for heating has only been faintly appreciated by scientists in the past, but the prediction is made now that if all the coal should give out we would soon be able to run much of our machinery from the power of the sun. With 500 mirrors properly arranged to focus the rays upon one point, a temperature of more than 1,000 degrees has been obtained. This almost equals one-fifth the highest temperature recorded by the electric furnace, which is considered today the most powerful heating apparatus ever discovered. As there is no limit to the number of mirrors that may be employed, and as the intensity of the heat increases in proportion to the number of rays reflected by the mirrors, it is conceivable that a temperature may be obtained in time that will surpass anything ever dreamed of in the past or present.

Hitching the sun to run electric motors for furnishing light and power for our homes and factories is the very latest achievement of the modern work of harnessing the elements to do man's work; and one square yard of sunshine in the tropics may represent, on the average, one horse power.