

## MYSTERIES OF MINING

*This is the fifth in a series of features describing various interesting phases of mining and the mining industry.*



*The old fellow who first discovered explosives must have felt like this: considerably surprised but none the less grateful.*

# DYNAMITE

Of all the tools that the miner uses in his search for gold and silver, for coal and petroleum, and for all of the hidden wealth of the earth, dynamite is probably the most indispensable. Without the use of this remarkable material, it would be simply impossible for man to penetrate to depths thousands of feet below the surface, or for him to open up mile upon mile of tunnels, drifts and stopes in his pursuit of minerals.

Dynamite is one of the two types of explosives—substances which when converted into a gas from their original state develop a sudden pressure on their surroundings. The first explosive was discovered more or less by chance, back in the 13th century when Friar Roger Bacon, attempting to purify a salt, stumbled on to a mixture of sulphur, charcoal, and nitre which when ignited, exploded.

For many years gun powder was the only known explosive. Then, in 1863, Alfred Bernard Nobel a Swedish chemist and engineer, started some experiments with a little-known substance called nitroglycerine, made by spraying glycerine into a mixture of nitric and sulphuric acids.

Nobel discovered that when he mixed the highly sensitive and dangerous nitroglycerine with an absorbent and inert substance such as clayey sawdust it became safe to handle and easy to control. He patented this mixture in 1867 and called it dynamite. He made an immense fortune from his invention, and when he died in 1896 he left the income from this fortune to be given annually in the form of five prizes, one of them to the person who best promoted peace on earth!

Now dynamite is entirely a commercial explosive and not a munition of war. Its sensitive qualities make its use impossible in shells; its disruptive force makes it unsuitable as a propellant in rifles or cannons. The machinery and plants used in the manufacture of dynamite cannot be turned into the production of smokeless powder, picric acid, T.N.T., or other explosives used in war and classed as munitions.

Since Nobel's monumentous discovery, many improvements have been made in dynamite. Several different types of dynamites are now manufactured, containing varying amounts of nitroglycerine, in addition to other materials affecting ease of handling, safety, and rate of detonation. Straight nitroglycerine dynamites have a relatively high rate of detonation, and are used when quick action or a shattering effect is required. Ammonia dynamites, most widely used, contain in place of part of the nitroglycerine, ammonium nitrate which slows down the velocity of the detonations somewhat and makes the action less shattering; it is safer to handle than straight nitroglycerine dynamites and the gases are less objectionable. Gelatine dynamite contains instead of part of the nitroglycerine a colloidal solution of nitrocotton in nitroglycerine, absorbed in a mixture of sodium nitrate and wood meal. This dynamite is water proof and is used for under-water blasting. Ammonia-gelatine dynamites are a combination of the two above. Blasting gelatine consists of nitroglycerine in which has been dissolved nitrocotton to form a jelly, together with a small proportion of an antacid solution as chalk. It is a tough rubbery material upon which water has no effect, and is only used where the greatest possible concentration of energy is required.

Three pounds of dynamite were sent off in San Francisco in 1867 — the first manufactured in the United States. Since that time the mining industry as well as engineering science in general has been revolutionized by the use of this commercial explosive. In 1936 about 300,000,000 pounds of it were used in the United States for mining, quarrying, engineering works, harbor improvement, agriculture and other purposes. Seventy-one million pounds were used in the mining of coal, and about 53 million pounds in the mining of gold, silver, copper, lead, zinc, aluminum, and other non-ferrous metals. Some 20,500,000 pounds were

needed for the mining of iron. Twelve million pounds of dynamite are used each year by farmers to drain wet lands, to blast out stamps and boulders, and even to plant trees. Immense quantities are used to open up harbors, to blast foundations for skyscrapers in big cities, to build tunnels for subways and electrical systems.

It takes about 0.9 of a pound of dy-

namite for every ton of crude gold, silver, copper, lead, and zinc ore mined; for every ton of coal mined about 0.29 of a pound of explosive is used, and for every ton of iron ore, 0.37 pound.

(Note: Figures on use of dynamite from "Bulletin of Information" of Institute of Makers of Explosives, New York City).

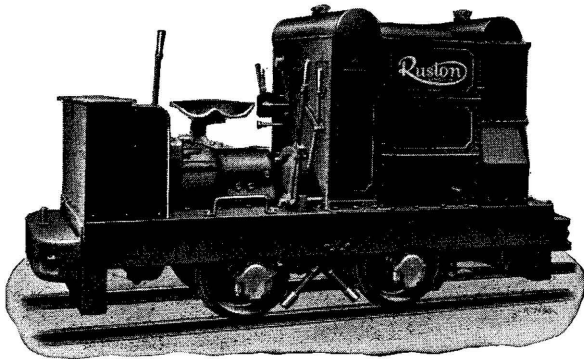
*Storing dynamite underground at United Paracale.*



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