Alfred Drake, M. D., of Philadelphia, Pa. This is the first exhibition of the machine; the apparatus consists of a horizontal cylinder of 16 inches diameter, with piston, crank and a large fly-wheel—the whole resembling in size and appearance a steam engine of say 25 horse power.

Everybody has heard how gas accidents sometimes occur in great cities like New York, —how the pipes in apartments are sometimes accidentally left with their stop-cocks open,—how unwitting persons enter with lighted candles, and explosions ensue,—how vaults under the street, becoming thus charged with gas, have blown up with tremendous force, attended with loss of life and property.

Mr. Drake is a philosopher after the Franklin school. He proposes to harness up this rampant power, and put it to a useful service. He admits a mixture of gas and air into his cylinder, and then touches it off with a hot iron. An explosion is the result, and the piston is driven to the other end of the cylinder. This operation constantly repeated gives rotary motion to the fly-wheel. "It is well known," says the inventor, with correctness, "that certain gases and vapors, when mixed with definite proportions of atmospheric air, form inflammable compounds, which burn rapidly or explosively when fired, the heat evolved occasioning a large increase of bulk, or an expansion.

When a mixture of one part of coal or illuminating gas with nine or ten times its bulk of atmospheric air is confined, as in the cylinder of an engine, and then ignited, a great pressure is exerted by the expanded products of the combustion in every direction. This," continues Mr. Drake, "is the power which actuates the "Ignition Engine," which may be described, in fact, as an air engine, using fuel in a gaseous form in its cylinder, and dispensing with a separate heater, furnace, smoke-pipe, &c."

We should need an engraving to convey a clear idea of the internal parts of the machine. As a mechanical curiosity, it is certainly interesting to look upon. But so far as economy or practical utility is concerned, it is to be classed with Ericsson's chimera.

Mr. Henry Meigs, Recording Secretary of the Institute, in his address at the opening of the Exhibition, delivered a dreadful broadside against our old friend Steam, and at the same time heralded, with a loud blast, the advent of this new gaseous substitute. Only hear him: —"Look at the Ignition Engine, sought for these hundred years, to be rid of that terrible boiler, whose burstings have killed more human beings than were killed at the capture of Sevastopol. The inventor, Dr. Alfred Drake, of Philadelphia, now here with his engine, forms the gas as fast as it wanted, and injects regular measured charges of it into his cylinder, where it ignites by means of a small piece of iron, which is kept hot. The ignition of the gas forms the requisite vacuum, giving the weight of the atmosphere only for power, and not by expansion, so that the danger from explosion is nothing. Space is saved, and in all things a saving is made of probably forty per cent. Here is a great triumph of mechanical skill, entirely subject to your will. Not like that tremendous steam boiler which has so often struck horror into the minds of men, like the destroying angel."

It is barely possible that if the inventor employs for his attendants a few aeriform individuals like Mr. Meigs, he may be able to secure a supply of gas so cheap as to effect, with his engine, a saving, as claimed, of forty per cent. over steam. But should he be reduced to the necessity of distilling his gas from coal, he will find that all his savings are overbalanced by loss. Our city gas companies, we opine, will never have occasion to enlarge their capacities in consequence of the introduction of the above contrivance.

The Cloud Engine.

This is a patented invention by Wm. Mount Storms, of this city, and is now for the first time publicly exhibited. Its peculiarity consists in the introduction of a portion of cold air with the steam in the cylinder, whereby it is claimed that a saving of 73 per cent is gained over the use of simple steam. The engine exhibited at the Palace is a small one on the horizontal plan, having a cylinder of 6 inches diameter and 14 inches length. Estimated power, six horses. It has nothing externally to distinguish it from the common steam engine, except that on one side there is an extra pump which forces in the required supply of air. This pump is surrounded with a water jacket to keep it cool. It is a matter of importance to have the air cold when it enters the cylinder; hence the air passes from the pump into a reservoir, where its temperature is further reduced, and then to the steam cylinder. The proportion of air employed to steam is one-third. The air is first let in, and its valves closed, then the steam. There is no change in the exhaust.

The name Cloud Engine is given from the fact that the steam, when it combines with the air in the cylinder, instantly assumes the form and color of fog—the same, in short, as steam when it is discharged into the atmosphere.

The inventor claims, as stated, a gain of seventy-three per cent. over simpl esteam. This we are told is a proven fact, of which there is abundant witness; the tests having been carefully made with a 30-horse engine.

The inventor's theory as to the *why* and *wherefore* of this gain is said to be, briefly, as follows:—Between cold air and hot steam there is a strong affinity, electrical in its nature. The globules of simple steam are solid, that is to say they are not hollow. When air is introduced, as in the engine, a sudden change takes place, and hollow vesicules are formed, occupying greater relative space—in other words, increased expansion takes place.

The engine at the Palace had only been running for a short time when these notes were made, and no opportunity had been given to test the economy or power of the machine.—We shall, hereafter, examine it more critically. If it will accomplish all that the inventor claims, it is certainly a remarkable discovery. Several times while we were looking at it, and when it was working at a pretty rapid pace, the air valve was opened, so that no air passed into the cylinder, but discharged into the atmosphere. The result, in every case, was an immediate falling off in the speed.

Stone Dressing Machine.

The American Stone Dressing Co., of this city exhibit, for the first time, one of their full-sized Steam Stone Dressing Machines—Eyre's patent. The reader will find engravings illustrative of this invention in Vol. 9, Scientific American. Its operations at the Palace attract large crowds of spectators, who evince astonishment at the rapidity of its movements and the excellence of its work. In outward appearance the machine resembles an iron planing machine, the stone being moved on a traveling bed. The cutting is done by means of series of chisels held above the stone at an angle to its surface, just as a workman holds the same tool when at labor. Behind the chisels there is a strong cylinder, having projections upon its periphery, similar to the barrel of a hand organ. As the cylinder revolves, these projections, like so many hammers, play upon the butts of the chisels, and drive them on to the stone with great force. Ornamental work, such as cornices, fluted columns, &c., may be done with the same facility as plain dressing. The machine shown at the Palace, although not of the largest dimensions, strikes, we are told, 28,000 blows upon the chisels per minute, dresses 1000 superficial feet of stone per diem, and saves the labor of fifty or more men. Larger machines have correspondently increased advantages.

Rope Machine.

A very interesting and curious specimen of mechanism is the patented rope machine of Harris, Stott, Richmond & Dutcher. This apparatus condenses the long old-fashioned rope walks into a space five feet square, makes ropes of every kind and variety, from every species of material, of every size, from bed cords to men-of-war cables. One of these machines, attended by a boy, turns out, we are informed, the ordinary inch manilla rope of commerce at the rate of some thousands of feet per diem, accomplishing the labor of seven or eight operatives. Nor is this all.—The quality of the article produced is superior to the hand made, since the tension of each thread and strand is more even. Some of the finest specimens of rope we have ever seen were done by this invention. The improvement is now on exhibition for the first time. The patent is owned by the Troy Rope and Cordage Co., Messrs. Briggs, Draper & Church, agents, Troy, N. Y.

[Our notices of the Fair, and its many interesting objects, will be continued in our next issue.

Gunpowder, Percussion Powder, and their Substitutes.

[Concluded from last week.]

There are, however, certain detonating compounds which contain no oxygen, nor any other supporter of combustion, but which are easily caused to undergo an internal change, and to resolve themselves into gaseous products. The most remarkable of these are certain substitution products of ammonia—the so-called ammoniurets of gold and other noble metals, and the so-called iodide and chloride of nitrogen. The iodide is a black powder, which, when dry, will explode on the slightest touch of a hard substance, and even sometimes by a sudden concussion of the air near it. Its composition has been examined and found to be always N.H.I.2. The chloride is a still more dangerous substance, since it explodes with the greatest facility under water. It is an oily liquid, discovered simultaneously, in 1811, by M. Dulong, in France, and by a young English chemist, Mr. Burton, of Tonbridge. Mr. Gladstone's analyses gave as its composition N.2, H, Cl.5. The qualities requisite to render an explosive practically useful depend, of course, on the purpose to which the explosive is to be applied. If it be merely for the production of an instantaneous flame, in order to ignite some other body, those compounds which are exploded by percussion have a great advantage. Percussion caps of various kinds were exhibited—those intended for muskets being filled with a mixture of equal parts of fulminating mercury and chlorate of potash, fixed by a varnish; those made use of for cannon being charged with two parts of chlorate of potash, two of native sulphuret of antimony, and one of powdered glass, which last appears to be practically a beneficial ingredient, although it takes no part in the chemical action. Caps made of fulminating mercury and collodion, bronzed over, were also shown. Explosives, however, are generally intended for blasting. Most of the compounds previously described explode too rapidly, and produce a very powerful local effect. If employed in fire-arms they would tear or strain the gun, and not propel the ball any great distance. Gunpowder, if tightly compressed, as in a fuse, or a port-fire, burns comparatively slowly; the necessary rapidity of explosion is given to it by granulation; and this can be modified according as the different purposes for which it is manufactured require. Supposing an explosive to have the necessary propulsive power, a very important quality is safety—safety in the process of manufacture, and in its subsequent keeping and handling. This practically excludes the use of all those compounds which are exploded by a blow. Gunpowder requires a temperature of 600 deg. Fah. to ignite it; and this gives it a great advantage over gun-cotton, which is fired by a heat not much exceeding that of boiling water.

It is a desideratum that the explosive should not be injured by wetting. In this respect gunpowder fails, while gun-cotton, and several of the substances previously mentioned, suffer no injury by being soaked in water and dried again. Good gunpowder, however, is not materially affected by the ordinary damp of the atmosphere. Nitrate of soda, though it contains a much larger amount by weight of gas-forming constituents, cannot be substituted for nitrate of potash in the manufacture of gunpowder, partly because the resulting mixture is hydroscopic. The complete combustion of an explosive is another desideratum. In firing cannon a considerable portion of the charge of gunpowder is always lost, by being blown out unburnt; but this is the case to a much greater extent with gun-cotton. It is important, also, in respect to fire-arms, that the products of combustion should not foul nor corrode the piece. Gunpowder leaves a considerable residuum, which has to be sponged out afterwards, but it is an alkaline salt, and has little effect upon metal. Gun-cotton, on the contrary, leaves no residuum; but the piece remains filled with the highly corrosive red nitrous fumes, which have an acid re-action. Cheapness is, of course, an important element in comparing the practical value of different explosives; but the calculation must be made not according to the weight, but according to the propulsive force of the various substances. This review of the qualities requisite in an explosive shows that gunpowder is admirably suited to such a purpose, on account of its great propulsive power with little local strain, its great safety, both in manufacture and use and its cheapness. It has two disadvantages its being spoiled if wetted, and its leaving after explosion, a quantity of solid matter. It is evident that most of the fearfully explosive substances with which chemistry has made us acquainted, are perfectly inapplicable to the projection of balls. Mixtures containing chlorate of potash, though good in some respects, are dangerous. Gun-cotton is the only substance that puts forth, just now, any great pretensions as a substitute for gunpowder. Its propulsive force is somewhat about three times that of an equal weight of powder, and it has some other advantages, coupled, however, with serious disadvantages. The Austrian Government has lately put it very fully to the test of experiment; and that they have been to some extent satisfied of its value, is attested by the fact that a considerable number of cannon, of great thickness of metal about the breech, have been formed expressly with the object of employing it. It is said to be a modification of gun-cotton which is used. In England, experiments have sometimes been made with this material, and it is said to have been employed with advantage for filling shells; but on account of the many accidents that have occurred with it, it finds little favor at present with our military authorities.

Economy of Oil on Railroads.

We have received from Edward H. Jones, Master Mechanic on the Albany and Utica Division of the New York Central Railroad, his monthly report, giving the quantity of oil used and the miles run by engines during the past month (Sept.) The saving of oil during the past month is wonderful, amounting to nearly one-eighth over the previous month. In Aug. 46,675 miles were run, using 2904 pints of oil —16 miles to the pint. In September 48,305 miles were run, using only 2,554 pints, or 18 91-100 miles with one pint. One engineer of a freight train, D. Apps, has increased his run seven miles to the pint of oil; another, John V. H. Beech, has increased the run 17 41-100 over last month. These are certainly astonishing results, and exhibit what carefulness can do in one line of economy.

Singular Robbery and Large Reward.

Some time last month the American Express Company was employed to convey certain boxes of specie, each alleged to contain $25,000, from the Land Office, Dubuque, Iowa, to the U. S. Sub-Treasury in New York. The boxes were of peculiar shape, iron hooped, and sealed with the Government stamp. They were duly delivered at New York, the seals apparently untouched, and the whole without the least indication of having been meddled with; two of them were found, on opening, to contain leaden balls instead of specie. The Government demands the restoration of $50,000 by the Express Company. The latter declares that the boxes were delivered in the exact condition received but it is willing to pay the loss on the substantiation of contrary proof. In the meantime the Company has offered a reward of fifteen thousand dollars for information that will throw light upon the fraud.

New Locomotives.

The Central Railroad Company has just ordered up six more locomotives. They will be built at Schenectady, and will have a sufficiency of power to go forty miles an hour "with one hand." These machines will cost twelve thousand dollars each; a large expenditure, but one warranted by the immense business which comes to this, the greatest thoroughfare in America. The Hudson River Railroad Company is also getting four new engines built for the passenger business. The Albany and Boston Company is getting three new machines at Lowell. These orders speak well for the fall trade, and show that the anticipations made in July, are being very rapidly realized.—[Albany Knickerbocker.