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FRUITLESS INVENTION.

If a man walking in the fields picks up a diamond and goes straightway and locks it up in his strong box it is commercially no better than a pebble, and might be one for all the benefit it confers upon its possessor. So with the inventor, who, after years of toil, suffers his inspiration to come to naught for want of energy in putting it before the public; his time is lost, his ingenuity has borne no fruit, and neither he nor the world is a whit the better for the discovery.

There are at this time, as there is at all times, countless instances where ingenious persons have machines locked up in closets which might as well have never been constructed if they are suffered to remain idle. If the wheels never move to some purpose, if the iron sinews and steel arms never save human muscle, and lighten the curse pronounced upon the race, the metals should be melted up again to serve some good end if possible.

A good invention unapplied—not a perpetual motion—is capital locked up, and it is the supremest folly for a man to spend his time in originating some improvement in the arts and straightway conceal it, so that no one receives any advantage therefrom. Such a case occurs to us at this writing. The inventor of a novel machine for a novel purpose, recently described in this journal, keeps said machine up in the garret of a house carefully enveloped in as many wrappings as Gliddon's mummy. Once in a while he explains it to some confidant, gloats over the fortune it would bring him if it were applied in practice, but takes no step toward securing that fortune beyond the possibility of losing it. In the meanwhile there is, doubtless, some other more enterprising inventor making long strides to circumvent our slow fortune. Fortunes do not go begging now-a-days. Given—a mechanical problem and a certain reward for its solution, a hundred ingenious individuals stand ready to seize the prize.

If an invention is good for nothing but to lock up why ever make it? Experiments are good and necessary to the perfection of every invention, but there is an end to experiment and a time to strike out boldly into actual operations. "Once begun the battle is half done," says the proverb, and our old copy-books say "Procrastination is the thief of time;" let the wise reader who has an invention of merit see to it that he is not robbed of his time and money by his own foolish procrastination.

EXPLOSIONS—OUR CITIES IN DANGER.

In his last report the Secretary of War recommended to Congress the removal of all powder magazines from the vicinity of our large cities, but in the multitude of important matters demanding the attention of Congress the subject failed to secure attention. If one of our cities should be smashed into rubbish the members of Congress would doubtless proceed, with feelings of mingled awe and remorse, to comply with the Secretary's recommendation. We, however, ought not to need any further warnings to rouse our legislators to the importance of this measure. The recent explosion at Erith, in the vicinity of London, occurred not in a powder mill, but in a warehouse where powder was merely stored, and so thorough were the precautions adopted that the *Mechanics' Magazine* is led to an improbable theory of spontaneous combustion to account for the ignition. That explosion was the greatest that ever occurred in England, and one of the English papers says, that the buildings which recently covered some acres at Erith are heaps of tumbled earth and bricks and massive fragments of timber.

We have no doubt that in handling the powder in our magazines the most approved regulations are adopted and rigidly enforced by our intelligent army officers, but there is one danger against which it is probably impossible effectually to provide—that is lightning. It will be remembered that during the past summer a serious explosion of ammunition occurred from this cause in General Sherman's army in Georgia. From lightning also resulted the greatest and most disastrous explosion of gunpowder that ever took place in the world. In August 1767, a flash of lightning struck the church of St. Nazaire, in Brescia, Italy, setting fire to 100 tons of gunpowder, which was stored in the vaults. The explosion destroyed one-sixth part of the city, and killed about 3,000 of the inhabitants.

No rules however rigid, and no precautions however complete can render safe the location of large magazines of gunpowder in the vicinity of cities. We hope that among the earliest acts of the next Congress will be the removal of these magazines to isolated positions where their explosion would not result in any considerable destruction of life and property.

BIRDS IN CENTRAL PARK.

We invite the attention of the Central Park authorities to the remarks of Dr. Trimble at the Farmers' Club, reported on another page. It seems that there is one effectual protection, and one only, against the ravages of that minute but most destructive class of animals, the insects that devour our fruits and crops. This protection is found in the insatiable hunger of insectivorous birds. To sweep away the measure worms, canker worms, and all others of this class of pests we have only to fill our trees and shrubs with flocks of singers and warblers.

The way to fill the trees of the Central Park, or the trees of any grounds with birds, we can point out from our own experience. It is only necessary to plant a few cherry trees. The reed bird and the robin, especially, will flock into these trees in multitudes. As both the cherries and the birds would be protected in the Park, the success of the experiment would be assured. The one charm that is yet wanting to that beautiful pleasure ground is the air made vocal with the joyous songs of birds.

GALVANIZING IRON—A PRIZE TO THE INVENTOR.

In a report in *L'Invention* of the proceedings of the Societe d'Encouragement Pour l'Industrie Nationale, we find a report by M. Barral, in the name of the Committee of the Chemical Arts, on the prize founded by M. le marquis D'Argenteuil, in favor of the author of the discovery the most important for French national industry.

M. Barral says that the chemist Malouin in the middle of the last century proposed to substitute zinc for tin in protecting iron from rust, but when the manufacturers pointed out to him that some parts of the surface would escape being covered, and would consequently rust, he had nothing to reply to them. His discovery remained therefore a whole century unfruitful. But M. Sorel, enlightened by the great dis-

covery of Volta that zinc places iron in conditions entirely different from its ordinary conditions, rendering it non oxidisable in the air, perceived that if the iron was in contact with zinc at a portion only of its surface, it would be protected from rust throughout its whole mass.

M. Barral also says that the process of galvanizing iron has been materially improved within the last six years, especially in regulating the thickness of the coating to just the quantity necessary, which has greatly economised the process.

The prize bestowed on M. Sorel is the fourth of these prizes that have been decreed. The others were to the learned engineer Vicat, the illustrious chemist Chevreul, and the celebrated mechanician Heilmann.

DEFINITIONS OF GEARS.

Cog wheels, as they are familiarly called, are of different classes and titles. The several varieties are here explained:—

A spur wheel has its teeth placed straight across the face of the wheel in line with the shaft, like the prongs of a spur.

A beveled wheel has the face inclined on one side at an angle of 45° with the shaft.

A worm wheel has its face hollowed to receive a screw, and the teeth are inclined to suit the spiral of the screw thread.

A ratchet wheel has its teeth all leading one way, like a circular saw.

Spiral wheels have teeth inclined at various angles with the side of the rim. Sometimes the teeth form a V across the face, or they may be of any shape to suit the whim of the designer.

Staggered gears, as they are sometimes called, have square teeth set diagonally across the face; the second row of teeth are not placed in line with the first but "staggered" or set opposite the space in the first row. These are often used for planing machines, or where motion in one direction is to be suddenly changed to an opposite direction. They are supposed to prevent lost motion, but are not efficient for this purpose except when new.

Backlash of gears is the rattling noise caused by one wheel moving at a greater velocity than the other, and being suddenly overtaken by it. The face of one tooth therefore strikes against the back of the other. Gears set too deep, or so that the teeth bottom will also make a heavy rumbling sound. Staggered gears do not prevent backlash except when new. The tooth, or teeth that take the heaviest strain, or backlash, will soon wear so as to lose it, and in time the system will accommodate itself to the work, so that no benefit will be realized from them or it.

Spur gears for communicating direct motion, are as good as any toothed wheel. They are cheap to make, run well when properly made, and with but little jar. It is a great fault to make small gears with large pitches. It is akin to making small bolts with coarse threads. The coarse teeth have to be deeper, so that they are sooner broken and make more noise. Respecting the form of the teeth there is much diversity of opinion. It seems to be a favorite plan for general work to make them of the same shape that they naturally wear to, but very many mechanics make the teeth the frustrum of a cone, or a regular taper from bottom to top. Gears with wooden teeth driven by wheels wholly of iron are coming more into use for large, heavy sizes. The best wooden wheels have the teeth made of young hickory, or lignum-vitæ boiled in linseed oil, and set with the grain end on, in the direction of motion. The body of the wheel is iron, and recesses are cast in the face, in which the wooden teeth are set and fastened by wooden keys. When well made they run a long time. Tallow and blacklead are employed to lubricate them. Beveled wheels are also thus made.

A sprocket wheel, as the English artisans call it, is our rag wheel. The wheels on chain pumps are sprocket wheels, and are used to carry machinery driven by chains. The teeth are placed a certain distance apart, so that the wheels are sometimes eight sided, or six sided, the chain links are of course a certain length; this is called by some a clip wheel.

It is not necessary that gear wheels should be perfectly round; they work well when made elliptic or oval. Of course two wheels running together must