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**Contents:**

(Illustrated articles are marked with an asterisk.)



## INVENTORS---THEIR OPPORTUNITIES AND INTERESTS.

The number of patent claims published in our columns weekly is sufficient evidence of the existence of a large amount of inventive talent in the country; that all these patents do not prove remunerative, or that some of them are improvements only in name, does not militate against this statement. Still, the long list of patents might be much further extended, we think, by the more general cultivation, by our mechanics, of a habit of close observation. An observing and reflective man, possessing natural mechanical capacities, can hardly pass through a workshop in any department of industry, without seeing opportunities for improvement either in the tools and other appliances used, or in the methods of doing work. But it not unfrequently is the case that the mechanic who is constantly engaged on the work does not notice the room for improvement which the stranger sees at a glance; the familiarity induces indifference. Yet, the working mechanic is continually meeting with obstacles to rapidity and perfection of work, and in providing temporary expedients for relief, he may as well perfect them and make them permanent and valuable fixtures of the shop. If properly elaborated and wrought out in the brain before being built, he may find that in developing them he has unconsciously become an inventor—made a patentable and valuable improvement—where he looked only for a present aid, or a "make-shift." Perhaps the exactions of his business will not allow him to devote the necessary time and attention to the improvement, and he must content himself with getting up hastily a temporary aid to his work.

But there come opportunities for this mental labor, which, however, are not always embraced. Such is the present state of dullness in business. The enterprising mechanic whose ordinary work fails him, can profitably employ his otherwise unoccupied time in attempting improvements in the materials, methods, tools, or other appliances used in his business. If he is compelled to a state of comparative physical idleness, so much more room and opportunity is afforded for the exercise of his mental powers. Plenty of instances of valuable discoveries, inventions, and improvements could be adduced to prove that such periods of enforced bodily inactivity have been advantageous to the observant and thinking mechanic.

It is the interest, also, of the inventor to make use of the means offered by our patent laws to secure to himself a portion of the advantages which his improvement possesses. A false idea of honor is that which either carelessly or supinely refuses to allow the inventor to reap a benefit from his improvement. He may consider it as not worth the expense, time, and trouble necessary to make him secure as its originator; but if others deem it valuable enough to use, he should deem it valuable enough to be paid for. It is not the marked and notable improvement that is always the most remunerative to the inventor, but often the little and seemingly unimportant advance on previous attempts, which proves a mine of wealth. If the inventor has any idea which he has so far brought toward a practical and visible form as to be understood, and which promises to be an improvement on processes, machines, tools, etc., it is his duty, as well as right, to secure his proprietorship by a patent at once. By this course he will be benefitted, while nobody will suffer an injustice.

## CUMBROUSNESS OF TOOLS FOR IRON WORKING.

A correspondent insists that the massive lathes and enormous planers, etc., which are deemed requisite in the large machine-making establishments, where heavy work is done, are a waste of material, an annoyance by their excessive weight, and unnecessary absorbers of power. He proposes lathes with hollow arbors, planers where the tool, rather than the work, shall be moved, and drills brought to the work instead of the work brought to the tools.

Many years ago, we knew of a "big planer," got up by Mr. Seth Wilmarth, then of South Boston, Mass., the "feed" of which was a screw, we think sixty feet long, but which was cut on a ten or twelve feet lathe by being fed through a hollow arbor and delivered through another hollow arbor on the tail of the lathe. The consequence was a screw-fed planer which could not, at that time, be matched in the world.

Now, it seems that if a continuous screw could be cut on that lathe for that especial purpose, another screw might be cut, or a shaft be turned of any requisite length, on any ordinary lathe having proper heads.

We have seen a planer, the movable bed of which could sustain a load of thirty tuns, and which was run by a special steam engine, take off two chips at a time of seven-eighths of an inch in depth by over one-eighth in thickness. But all the mass of thirty tuns must be moved alternately back and forth, the machinery sustaining the immense shock of the weight and the inertia of the load in the change from one part of the reciprocating movement to the other. It requires power—its direct exercise and palpable expenditure — to run such a machine, while it seems as though the lighter weight of the tools and their head might be much more easily moved. In regard to the use of boring tools on a massive gear or pulley, the plan is already in practical use. If the boring machine (portable) is carried to the work, power is emitted from the boiler through pipes in the form of steam, or is taken from a convenient shaft by means of belts.

We do not believe in carrying so called "improvements" so far as to shock common sense by the advocacy of novelties which cannot be proved to be real benefits, but it does seem to be practicable to so adapt the proportions of work to be done to the tools to do it, that some, at least, of the heavy labor now really necessary in our large machine and engine shops might be avoided, and some of the power now expended saved.

## COMPRESSED AIR AS A POWER.

The successful machinery used for tunneling Mont Cenis, in Switzerland (by which the water power of a mountain torrent is made to compress air, and this compressed air led by strong tubes in the tunnel is made to move the boring machines), has given occasion to some mechanical engineers in France to make plans for transmitting the water power of a river through air tubes to the adjacent city, and bring the tubes into the houses, as gas and water pipes now are, so that by turning on the supply of compressed air, the escaping air may ventilate the building, after moving small appropriate engines, and so serve for sewing machines, turning lathes, and many other kinds of machinery requiring so little power that the erection of a steam engine would be a needless expense. In many instances the total amount of work done at intermissions during a whole day amounts to only three or four hours, for which the steam engine is kept running ten hours; therefore a great saving would be accomplished with this power, which would be consumed only when real work is done.

At present steam power costs in France 62 centimes (12 cents in gold) per hour per horse power; the gas engines are said to cost 73 centimes; this new compressed air power, when steam engines are used to compress the air, will cost 67 centimes; and when water power is used it would come as low as from 12 to 16 centimes (about 3 cents) per horse-power per hour.

With the exception of a few weeks in dry summer seasons, an amount of water falls over the dam at Fairmount, Philadelphia, representing several thousand horse-power, which perhaps could be utilized in the same manner, compressing air and distributing this fresh air through tubes to localities where small amounts of cheap power and good ventilation are needed.

Compressed air is now beginning to be used to dispatch letters and parcels through tubes. In Paris such a system is in operation, and in New Jersey one is in course of construction between the cities of Newark and Jersey City. In London even a passenger railroad is propelled through very large tubes by the same means. However, in all these instances steam is the initiative power used. At the late Fair of the American Institute an experimental machine of this kind by the same means propelled thousands of persons through a large tube.

## NITRO-GLYCERIN---ITS USE, ITS DANGER---WHO SHALL DECIDE WHEN EXPERTS DISAGREE?

Although the existence of this substance, and a knowledge of its explosive nature, has been long known to chemists, it was only in the year 1864 that it was brought into public notice as a substitute for gunpowder. Consequently, all our practical acquaintance with its effects has been gathered within the last three years, and new facts are continually presenting themselves as its use becomes more and more general, which it is well to note.

The elements of nitro glycerin separate with immeasurable velocity, and hence the violence of its explosion, which has been variously estimated at from five to ten times the force of gunpowder. Other economical advantages over gunpowder, in mining operations, may be summed up as follows:

Fewer men are required for working the same sized piece of ground, and fewer holes have to be bored to dislodge an equal amount of rock. Hence a dearth of miners may, to a certain extent, be remedied in this manner, and less steel and iron need be used than hitherto.

Nitro-glycerin does not take fire readily, and when lighted burns but does not explode and goes out as soon as the flame is taken away. The holes can be tamped without danger. After firing the amount of smoke is small compared with that of powder, so that workmen can go back immediately to the place where they have blasted without inconvenience. Finally, holes that have missed fire can be retamped and fired, an operation at present either impossible or accompanied with great danger.

Against these advantages, it appears that the gases formed during the explosion have an injurious effect on the organs of sight and respiration. In course of time, however, the workmen get accustomed to it, and it is no longer looked upon as one which need restrict its employment. Nitro-glycerin, further, freezes easily, and explodes on being sharply struck, but the latter property is not more dangerous than the danger of gunpowder in taking fire readily and exploding.

The latest nitro-glycerin disaster that has come to our notice was the explosion at Newcastle, Eng. In the course of the inquest on one of the victims some interesting evidence was brought out. From the testimony given on that occasion by a Mr. Isaac Bell, whom *Engineering* seems to accept as good authority, it would appear that under a great variety of conditions this substance is liable to spontaneous decomposition. At ordinary temperatures this catastrophe may take place, and particularly is it dangerous if impure in composition. The gases given off, if confined to the vessel containing the liquid, exercise pressure on the remaining liquid, and explosion of the vessel is liable under the least shock or movement. If the explosive is brought from a cool to a warm place; if the substance be exposed to a temperature of 46° Fah., crystallization ensues; or if the temperature is high enough to cause ebulition, under any of these circumstances spontaneous decomposition would result.

The inventor of "blasting oil," Mr. A. Nobel, of Hamburg, asserts that nitro-glycerin can be stored for an indefinite length of time without deteriorating in quality, and that the peculiar property of not exploding by mere contact with fire, renders its carriage, storing, and handling very safe, even when in an explosive state. Mr. Bell, *per contra*, asserts that the compound is liable, from its specific gravity (which is 1·6) to explode from mere movement, and is consequently very dangerous merchandise for a railroad company to transport.

The former gentleman, writing to the London *Times* relative to the same Newcastle accident, bitterly complains that the introduction of this valuable explosive, owing to the accidents resulting, as he afterwards shows, from gross careness, has been systematically opposed, and thinks it high time that the public should know that nitro-glycerin has won its battle over prejudice, and obtained far to firm a footing in several countries ever to be banished from use unless it be by something better. The want of that useful knowledge has been the real cause of the late accident, for no one surely would attempt to store an explosive substance in a city unless unreasonable fear threw an obstacle in the way of conveying it to and storing it in its proper place. He says: "My own printed precautions, lately produced at the trial, best prove how strongly I object to that unreasonable mode of storing; but the puerile refusal to receive it in a powder powder magazine may place an agent in a very embarrassed situation. Instead of adopting every measure to paralyze the circulation of a powerful and useful agent, it were far better to follow the example of Mr. Warrington Smythe in enlightening the public as to its use, thus making it a beneficial instrument for the development of our mineral wealth.

"It not to be wondered at that the immense accidents of Aspinwall and San Francisco led to rigorous measures restricting the transportation of nitro-glycerin; but in Sweden and Norway that substance was already so favorably known and had got into such constant use, that the excitement abroad had no influence on the liberal regulations there, and until this day it is freely carried by rail in both countries, nor has it led to a single accident.

"In Germany, also, before the prohibition took place, thousands of parcels containing nitro-glycerin were sent by rail, without causing the least damage.

"On the other hand, we find upon inquiry that accidents have only occurred when nitro-glycerin was transported under a wrong declaration. Such was the case at Aspinwall and San Francisco, and it is only too natural that such unwarrantable neglect should lead to calamities. It is the same with gunpowder. Whenever people convey an explosive material the first thing they ought to know is its nature."

Then follows a list of nitro-glycerin accidents which have come to his knowledge, and in looking over the list it must be admitted that the substance has been very strangely abused:

"In five cases congealed nitro-glycerin has been melted purposely over fire.

"In three cases a red-hot poker has been inserted into the oil in order to melt it.

"In one case a man kept a cartridge with a percussion cap and fuse affixed and lighted it in his hand until it blew off.

"In one instance a man stood watching the burning of a fuse inserted into nitro-glycerin, until it went off and hurt him.

"In one case a captain set fire to a sailing vessel with a cargo of nitro-glycerin, and people went on board to extinguish the fire, but saved themselves, seeing what was the cargo, and the ship was eight hours on fire before it blew up, which could not possibly have been the case with gunpowder.

"In one instance two workmen, while filling cartridges with nitro-glycerin at the light of a tallow candle, set fire to some gunpowder strewed on the floor, but found time to save themselves and carry away considerable quantities of nitro-glycerin before the explosion took place.

"In one case two leaky canisters, full of nitro-glycerin,