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SCIENTIFIC AMERICAN SUPPLEMENT

No. 582

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UNSUCCESSFUL INVENTORS.

Inventive talent may exist and yet be utterly useless to its possessor. There are persons whose keen observation detects readily the need of improvement in some crude device, or whose capacity suggests some new thing or better method, but who are unable to devise the one or to give form to the other. Lack of persistence, cowardice in the face of discouragement, want of mechanical experience, ignorance of natural laws, one or all combine to bar the road to success. If the time and talent misspent on attempts to achieve perpetual motion had been directed to some possible improvement, the advance in mechanical art would be greater than it is. There are mechanics who ridicule the idea of discovering the means of perpetual motion, who are not ashamed to employ their time and skill on an absurdity fully as ridiculous. There is a bright mechanic, somewhat of an inventor in a small way, living in an Eastern city, who has been for several months trying to produce a road vehicle that shall run by weight, or by two weights, depending on the motion of the vehicle itself to wind up the weights as they run down.

His idea is that the motion of the vehicle on the road is a gradual accumulation of power—a reservoir of force, like the flywheel of an engine—and that this force may be utilized to give out power sufficient to rewind the weights as often as they run down. His model, which is a very workmanlike toy, runs over a smooth floor with great velocity, and the momentum of its speed does suffice partially to wind up the operating weight, and thus gives it another (somewhat feeble) start from a condition of almost rest. The mechanic hopes to give greater force to the winding-up arrangement, and make his self-propelled vehicle successful over city streets and good roads.

His belief in the power of mechanical devices to develop more power than is imparted is not an uncommon one; the expectation of getting more than is given is a common hallucination—it is the universal desire. But mechanical contrivances can only divert and direct power; they cannot create it.

Some would-be inventors go ahead with their work, and make their calculations with no regard to the element of friction; but with the most favorable appliances this hinderance to motion cannot be eliminated. The writer has seen a top, which was a metallic ring with a thin web connecting the pintle and point, run, after being speeded, thirteen minutes on a plate of glass. In this case, friction was reduced to a minimum, but it was acting continuously from the time the top was started until it finally brought it to rest. The elements of weight, atmospheric resistance, rubbing of surfaces, and imperfection of workmanship combine to produce friction, an obstacle that no mechanical device can overcome.

The inventor sometimes misdirects his efforts; the means employed to compass a result may be inadequate or unfit, or the object may be valueless. There are *bona fide* inventions which are not even improvements. It is useless to waste thought, time, and money on some mechanical device to do what can better be done by hand, yet this is frequently done.

The success of the inventor is more nearly assured when he is a practical workman, able to make a drawing, to construct a model, or, at least, to make a sketch and whittle out his idea; for verbal explanations to the professional model maker are not always clear. It is true, however, that some very valuable inventions have been conceived by men who were not practical mechanics, but how much of the success was due to the intelligent skill of the model maker and the manufacturer of the invention is not stated in the letters patent.

HARDENING CAST STEEL.

It is no uncommon event to have a nicely finished tool or other article spoiled in the hardening. This is the more vexatious because the cause of the disaster frequently cannot be discovered. Defective steel can usually be detected by a flaw. Overheating can be guarded against, and there may be invitations to a fracture which are avoidable. Pieces are sometimes lost in hardening because they are not properly prepared for the exacting test of fire and cold water. A piece of greatly varying dimensions will sometimes fly when it touches the bath, even if the heating has been even and "suant." Especially is this the danger if there is a cornered offset between the thick and the thin portion. In such cases, it is better to leave the piece unfinished and more uniform, and afterward finish it by grinding. The writer has been quite successful in such cases by dipping the thinner portion first—when the form of the piece would admit of it—and then the thicker portion, which would half temper the thin portion by its remaining heat before the entire piece was chilled. But articles of very disproportionate dimensions may be casehardened in some instances and be equally durable.

Cast steel articles containing cavities should always be provided with vents. A die block containing a die-sunk depression, not more than five-eighths of an inch deep, was ruined by being cracked in hardening, because the workman carelessly dipped it face downward.

A workman made a hollow mill for turning fixed studs on a casting. The hole in the mill was three-quarters of an inch diameter and two and a quarter inches deep. The mill was made from a round bar, two and a quarter inches diameter, as the radial teeth on the end were to face up a bearing more than two inches diameter at the bottom of the stud as well as to turn the stud. All around the hole there was three-quarters of an inch of solid metal. The piece was heated over an open charcoal fire, and dipped perpendicularly in the bath to a depth of about three-quarters of an inch, the remaining heated portion being relied upon to draw the hardened end. But the tool cracked more than half way around. A second mill shared a similar but worse fate, for on withdrawing it from the bath a broken portion was left behind, the mill having cracked entirely around. A pinhole was drilled in a third tool near the bottom of the hole and the hardening was successful, the minute hole being a vent.

Sometimes a piece of cast steel is so massive that while it may be heated clear through—the heating being a gradual process—the hardening, being sudden cooling, chills the outside while the inside is still at a considerable degree of heat. In such cases, a fracture may be expected, caused by the expansive force of the interior heat on the chilled and brittle exterior shell. Such an instance was afforded by the breaking of a solid steel tap, three and a half inches diameter, in hardening. The tap was cut to a pitch of eight to the inch, and finished. A piece from the lower end, two inches long, broke square off in the bath. The appearance of the fracture indicated that absolute hardening had extended slightly beyond the bottom of the teeth, the interior portion being apparently unchilled. The remedy in this and in similar cases is to drill a hole from end to end through the center of the piece.

Electric House Lighting by Primary Batteries.

Numerous attempts have been made to obtain a successful incandescent electric light by means of secondary storage batteries, charged from dynamos, but, owing to the small amount of electricity obtained in comparison with the power required, these batteries have so far, we believe, not been proved to be a commercial success.

One of the latest improvements in this direction has been the production of a primary battery, named the "Aurora," which is really an improved bichromate solution battery, having a power which is remarkable for its size, and the advantage of not polarizing, heating, or evolving any deleterious gases. Each cell holds about a gallon of the exciting fluid, which, we are informed, is made by a peculiar patented process, and is the important factor in the success of the battery.

Two large carbon plates are placed outside of the porous cup, and in the latter is inserted the zinc, of a special form to expose a large amount of surface. In the porous cup is put water, which in a few hours becomes charged with the exciting fluid from the outside jar. The zincs are well amalgamated to prevent local action. We recently attended a private exhibition of a complete system of house lighting by the use of this battery, as introduced into the residence of Mr. Henry V. Parsell, of this city, and were agreeably surprised to notice the power of the battery in sustaining with beautiful brilliancy several incandescent lamps, and the facility with which they could be lighted.

In a room adjoining Mr. Parsell's laboratory, together with a fine large screw-cutting geared lathe and other highly polished steel tools, were located on shelves twenty-eight cells of battery. None of the tools were corroded or in the least damaged by reason of fumes emanating from the battery.

In addition to its use as a lighting battery, it was shown that it could be employed as a motive power for driving the large lathe, by means of a small Cleveland electric motor, developing a force equivalent to one-third of a horse power.

A special switch was provided, which enabled the operator to utilize at once the force from one to twenty cells, as might be needed. No difficulty was experienced in rapidly boring, with large sized drills, through blocks of the hardest wood, two inches thick.

Many novel uses of the lamps were shown; half a dozen six-candle lights placed in a cabinet of minerals, when turned on, instantly lighted it perfectly. In a dome in the ceiling of the laboratory, painted blue and decorated with gilt stars, were hidden from view a group of small lamps. These when lighted produced a very soft, radiant effect, giving a light similar to that of a full moon on a clear night.

A special small Edison lamp of 40 candle power placed in a magic lantern was next lighted, and the pictures in the lantern thrown upon the screen. The brilliancy of the light compared favorably with the lime light.

A peculiar dark room ruby light, for photographic purposes, was shown, and also the perfect adaptability of small lamps for illuminating safely dark closets. Adjustable lights with neat porcelain shades mounted

on a stand for desk use or for reading purposes, as well as suspended lamps, were also exhibited.

We were informed that about thirty lamps of varying candle power had been distributed about the house, but the full power of the battery was not capable of sustaining more than eight sixteen candle power lights at a time.

It was expected that for ordinary use but half a dozen lamps would be used at once.

In comparison with the results obtained, the loss of zinc in the battery is exceedingly small. Mr. Parsell stated that although the zincs had been constantly immersed and the battery had been working for two months, the zincs had lost but a few ounces each in weight. He had replenished the battery but once during that time, having used it every day.

The advantage of having electricity generated for general use in one's house so easily, and with so little trouble and danger, as this battery appears to furnish it, cannot be overestimated.

We understand its practicability has been so well established by prolonged experiment that a new company, with a large capital, called "The Household Electric Light Manufacturing Company," of New York, has been organized for the purpose of putting in electric plants in private residences and caring for the batteries, keeping the same in order.

The small lamps, their attachments, and the battery are supplied by the Stout-Meadowcroft Company, of this city.

Impurities in Metals.

Mr. W. Chandler Roberts-Austen, F.R.S., Chemist of the Mint, delivered lately at the Royal Institution, London, the first of four lectures upon "Metals as Affected by Small Quantities of Impurity." He said that metallurgy has to deal at once with large masses and with small particles, for the influence of the latter upon the former is out of all proportion to their relative quantities, and their action may be chemical, or physical, or both. Minute impurities in metallic copper would render, he said, ocean telegraphy impossible. Geber proved that the "cry" of tin, or the noise which it makes when bent, can be removed by purification. Arsenic in the most minute proportion will restore the cry of tin, and its action in this respect has been known at least since the third century of our era; arsenic makes tin as brittle as zinc. The fact that such small proportions of foreign matter so alter the character of metals tended more than anything else to confirm the alchemists in the doctrine of transmutation, and encouraged them in their attempts to make gold by artificial means. A little arsenic in melted lead will make it more fluid, so that when poured down an inclined plane, say, of white paper, the lead will roll itself into small shot; with the arsenic absent, it will merely chill in a black streak upon the paper. The speaker proved this by experiment, and invited attention to the following figures:

ANALYSIS OF LEAD SHOT.

Lead, with small quantities of antimony, iron, etc.	99·72
Copper	0·16
Arsenic	0·12
	100·00

This proves what a very small proportion of arsenic is necessary to produce the effect.

Zinc, said the lecturer, melts at 412° C., and standard gold at about 900° C., but if less than 0·2 per cent of silica be added to gold, it will soften in the flame of a candle. This was demonstrated by experiment. A trace of antimony in melted lead will cause it to oxidize on the surface much more rapidly than would otherwise be the case, and by stirring the mass it is soon transformed into a kind of pasty oxide. Cadmium also promotes the oxidation of pure melted lead, and that, too, with a play of the most beautiful colors. Mr. Roberts-Austen proved this by illuminating the surface of the melted alloy with a beam of parallel rays from the electric lantern, and projecting upon the screen an image of the surface of the molten mass; as the films of oxide formed they were removed with a little scraper, to make way for fresh surfaces, having somewhat the colors of shot silks. He stated that it may not be generally known that copper can be gilt as well by the application of an alloy of lead and gold to its surface as it can by an amalgam of mercury and gold. On the application of heat the copper absorbs the lead, and the gold is left on the surface. This process is recorded in a papyrus of the third century, now preserved at Leyden.

The alchemists, he said, through several successive generations down to the year 1746, authoritatively taught it to be a fact that all metals were composed of mercury and sulphur, combined in different ways; and those of them who claimed to have made gold almost invariably said that they had done so "by the aid of a powder received from a stranger." Dr. James Price, of Guildford, a Fellow of the Royal Society, was the last of the alchemists who believed in the transmutation of the baser metals into gold; he lived in the eighteenth century. Raymond Lully was confined in the Tower by one of the English kings, in order that he might make gold for the mint.

Even the illustrous Robert Boyle believed in the transmutation of metals, because in the usual orthodox way he had "received from a stranger" a powder which would change 1,000 times its weight of gold into a baser substance, and he did not see why the operation might not be reversed. He had probably made what is most dreaded at the mint, an alloy of gold and lead. The lecturer here melted down one hundred sovereigns, and cast a little of the molten metal into a small bar, to show that the metal was strong and malleable and tough. To the remaining greater bulk of the molten gold he, however, added a trace of lead, and cast the mixture into a large thick bar, which, when almost cold, and when held in the palm of the hand, broke into pieces upon being tapped with a hammer. A small trace of lead, he said, will reduce the breaking strain of gold from 20 tons to the square inch to 5 tons, as indicated by a testing machine.

He then stated that palladium will absorb 900 times its volume of hydrogen gas, and give it out again when heated. A remarkable discovery has recently been made in France, that an alloy of rhodium and lead will absorb nitrogen and oxygen, and when heated give them off, as gun-cotton does, with explosive violence. He placed a small piece of rhodium, containing 17 per cent of lead, in a tube, and next withdrew the air from the tube by means of the Sprengel pump. The heat of a spirit flame was then applied to the end of the tube containing the piece of rhodium and lead, and the alloy broke up with a small explosion, filling the end of the tube with metallic dust. The gases liberated were chiefly the same as those given off by ignited gun-cotton.

Pneumonia.

The prevalence of pneumonia, its rapid increase, and fatal consequences in many instances, have led a number of our abler physicians to carefully investigate the peculiarities of this alarming disease, and some of them have published the result of their observations in a way to benefit the public, not only by pointing out the best methods of prevention, but likewise of treatment, in the event of its occurrence.

Dr. John T. Nagle, Deputy Register of Records of the Health Board of the city of New York, has given much attention to the disease, and has prepared valuable statistical tables concerning it.

"The prevalence of pneumonia," he says, "may be owing to a lack of ozone in the air, or it may be because there is too much ozone. Sudden changes of weather and high winds, particularly from the north and east, certainly have much to do with it, and draughts of all kinds are bad, and should be avoided. Smoking may be a predisposing cause, as tobacco is certainly an irritant. Anything which irritates the lungs should be avoided. If people would breathe through the nose instead of through the mouth, especially when in the open air or facing a cold wind, the lungs would be less irritated.

"One great cause of the fearful death rate among children from this disease is undoubtedly the criminally foolish way in which they are dressed. Many mothers seem more anxious to make their children look pretty than to dress them comfortably. On a par with this is the folly of low-necked dresses among women as viewed from a health standpoint. Ladies so dressed will rush from a heated ballroom or theater into the open air, and then wonder that they have colds or pneumonia. Wear seasonable underclothing, and don't remove your heavy flannels too early in the spring or defer putting them on until too late in the fall. I should not advise people to coddle themselves, but one should dress according to the season, and should cover the body evenly. Add to this a proper regard for the general health and an avoidance of draughts, and one need not worry much about pneumonia."

Prof. A. L. Loomis, in his "Practice of Medicine," says: "It is a well-known fact that the disease attacks the poor oftener than the rich, the private oftener than the officer, the sailor on shore oftener than on ship, the soldier oftener than the civilian at the same post. It is unknown in the polar regions and common on the Mediterranean, increasing in a direct ratio from the poles to the equator. Elevation above the sea predisposes to it; north and east winds favor its development; rainy seasons or damp and marshy districts do not seem to influence it. Periods of steady and extreme cold have little effect except upon the old, but sudden changes are very disastrous. The first predisposing cause is age, the disease being most common in early childhood, from twenty to forty, and after sixty. The proportion of male to female victims is as three to one. Any general condition of the body which debilitates is a predisposing cause. The complications which render the disease so dangerous are those which diminish the nerve supply or weaken the muscular power of the heart. Bad sewerage and miasmatic influence are potent causes of the disease."

Pneumonia usually begins with a chill, intense and prolonged, generally at night, and followed by a correspondingly high fever and sharp pains in the sides. The disease is very rapid in its progress, reaching a crisis in from five to six days, and sometimes causing death within three days. Usually but one lung is affected, and often the disease is confined to a single lobe.

A person may have "double pneumonia," or pneumonia of both lungs, and recover from it, but the chances are against him. When the disease spreads to all of the lung lobes, death is certain, as the patient cannot breathe, and dies of suffocation. The diseased lung, at first inflamed, soon becomes hard and leathery, and incapable of performing its natural functions. A curious fact is that usually no second chill occurs when another lobe is attacked, and there appears to be no relation between the amount of lung affected and the intensity of the symptoms. All physicians agree in saying that the disease is not contagious, but may be epidemic, and it has been noticed that it is developed under the same conditions as diphtheria—that is, the conditions which produce diphtheria in the young are apt to cause pneumonia among adults.

Dr. J. R. Leaming, special consulting physician in chest diseases in St. Luke's Hospital, has published a little pamphlet concerning it, entitled "Endemic Pleuro-Pneumonia, as seen in New York during the past ten or twelve years." In that pamphlet Dr. Leaming holds to the theory that the pneumonia of the present day, or pleuro-pneumonia, as he calls it, is the same as the epidemic which caused such havoc among the troops in Canada during the war of 1812–15.

That the weather has much to do with pneumonia is apparent. The number of deaths in New York city for the first seven months of last year was as follows: January, 375; February, 486; March, 587; April, 512; May, 337; June, 229; July, 150. After August there is usually a steady increase until March, the most fatal month of the year. The death rate, too, is very high. The statistics so far published, both in hospitals and private practice, show an average death rate of at least 20 per cent, or one in five of those attacked.

The theories concerning the nature of the disease itself are many and varied. Some physicians hold that pneumonia is only a local manifestation of a general disease, others that it is a specific disease caused by a specific poison, while still others hold as tenaciously to the germ theory.

Without speculating upon these different theories, from what has been said in which all agree, it is plain that anything which lowers the vitality of the system is conducive to the disease, and should be carefully avoided. Overwork, either physical or mental, has much to do with it, and this explains why so many business men and brain workers become its victims. Sudden changes of the weather and draughts of all kinds are also to be guarded against. In a word, live temperately, dress warmly, avoiding all manner of imprudences, and you need have no fear of pneumonia.—*Hall's Journal of Health.*

DECISIONS RELATING TO PATENTS.

Complainants received letters patent Nos. 64,404 and 80,269 for improvements in tuck markers, which proved to be of little value. Defendant made improvements on same which cured the defects and rendered the device marketable. Complainants obtained a decree for assessment of damages and profits for infringement of the above patents. *Held* by Judge Butler, United States Circuit Court, Eastern District of Pennsylvania, Bostock and Wife *v.* Goodrich, that complainants must show what proportion of profits arising from the sale of the improved tuck markers was due to the original invention, and that, failing in that, they were entitled to nominal damages only.

Where one party stands by and permits another to take out a patent, and then takes out a patent for a different invention, he cannot set up that he is the inventor of the first improvement.

[The facts are as follows: Both parties claimed priority of invention. Complainant obtained a patent January 16, 1883. Defendant claimed that he made the invention at a time when he was employed by complainant in his shop, and it appears that he stood by while complainant made application for a patent without making any claim, and subsequently took out letters himself for another and a different invention. Butler, J., United States Circuit Court, Eastern District of Pennsylvania, Fraim *v.* Keen.]

The employment of mechanical skill to construct a machine in accordance with ideas furnished by another gives no right to the invention. The entire merit is in him whose inventive suggestiveness conceived the invention. McKennan, J., United States Circuit Court, Eastern District of Pennsylvania, Yoder *v.* Mills.

THE old and popular firm of J. Stevens & Co., of Chicopee Falls, Mass., manufacturers of the celebrated Stevens fire-arms and fine machinists' tools, have sold out their business to the new corporation just formed under the name of the J. Stevens Arms & Tool Co., with the following officers: Joshua Stevens, President; William B. Fay, Joshua Stevens, George S. Taylor, Directors; Irving H. Page, Secretary; Jas. E. Taylor, Agent and Treasurer. The above took possession of the business January 1, 1886.