Improved Wagon Tongue.

The object of this invention is to furnish a spring support for wagon tongues. It is without doubt much superior to the old method; avoiding all bumping, and adding to the comfort of horses, driver, and passengers.

A, in the accompanying engraving of this invention, is a piece bolted or screwed to the under side of the tongue, to which is pivoted the rod, B, extending back beneath the tongue to a cylindrical rubber spring, D. A collar, C, with nut running upon the rod, B, serves to adjust the support to hold the tongue at the proper hight. The rod, B, passes through the center of the rubber spring and through an eye in the center of the oscillating cross head, E. This oscillating cross-head permits all the necessary oscillation of the tongue and the support without allowing the tongue to hammer upon the neck-yoke, or hold-back supports, thus relieving the necks of the horses. The oscillating cross-head is pivoted to curved supporting bars, F.

These are all the parts of the device which seems simple and serviceable.

Patented through the Scientific American Patent Agency, Sept. 21, 1869, by George Alexander, of Romney, Ind., who may be addressed for exclusive rights to manufacture in the United States.

Suspension Bridges in China.

The construction of suspension bridges has been thought a signal achievement by the Western nations, but in China they are of great antiquity, and many still exist. They are made of iron chains, and their mode of construction resembles, in the main, that used in the Western countries. They are, however, generally confined to the mountainous regions, and span rivers whose navigation is interrupted. There is one over a river in the Yunnan province that is said to have been first built by one famous Chu-koh-hand more than two thousand years ago; and there is a second and much larger one in the Kwelchow province, spanning the river Pei. This latter was built during the Ming dynasty. It consists of many chains stretched across the river and fastened firmly in the stone on either bank; from natural elevations above, other chains depend, and are made fast to the span, and there are also chains fastened to it from below, the object being to make the bridge as firm as possible. A plank floor is laid on this bed of chains; it is repaired at regular intervals of from three to five years at the imperial expense. The span of this bridge is said to be several hundred feet.

"Ventilate your Sewers! Do not Trap!"

These words form the close of a very valuable address on the influence of sewer vapor on health, delivered by Dr. Carpenter, of Croydon, before the Social Science Association, and we think the substance of it deserves the widest circulation.

It is within the memory of this generation that typhoid fever has been distinguished from other fevers, and has been traced to sewage. The earliest efforts of sanitarians were directed to the abolition of those collections of impurity in cesspools which formerly poisoned the earth, air, and water for our forefathers; and with the introduction of water-closets and of tubular drainage, it was hoped that typhoid fever, at least, might be exterminated. Nevertheless, it did recur again and again, as at Croydon; because, says Dr. Carpenter:

"In the early sanitary works which were carried out under the supervision and with the approval of the General Board of Health, and under the authority of the Public Health Act of 1848, the consequences of sewer gas not being foreseen were not guarded against; no provisions were made to prevent its ascent into the house, or for exit into the open air before it could reach the inside of the dwelling. The rapid spread of luxurious habits among the people, the introduction of low fireplaces and register stoves, and the method adopted to exclude drafts by having exceedingly close-fitting windows and doors, prevented the easy exit, and its baneful influence became manifest, often without the real cause being at that time at all suspected. It often happens that the easiest way for air to enter the house is by the sewer."

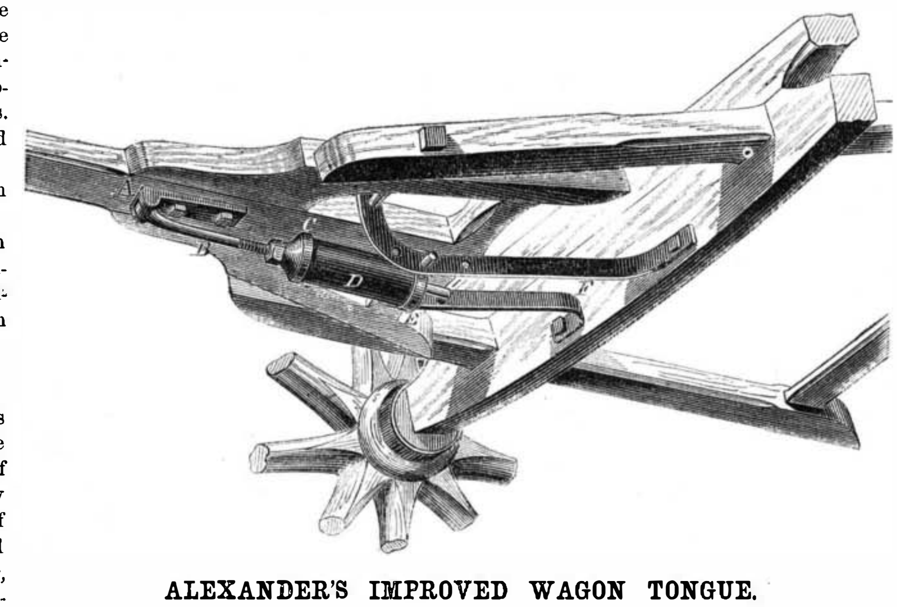
Then, with this state of things, "fever would recur; fever always the same in type, 'the enteric or typhoid' form, with rose-colored spots, often with abdominal complications, and always in those houses nearest to the top of the sewer (perhaps I should say generally), and farthest from the outfall."

Nor is fever the only consequence of the entry of sewer gas into dwelling houses. "Many other disorders of the system," says Dr. Carpenter, "have been directly traced to its influence —thus diarrhea; dyspepsia in all its forms; palpitation of the heart; various forms of asthma (indeed, it may help to explain some of the vagaries of this curious disease); convulsions, especially in teething infants; headaches, both persistent and intermittent. The evils which sometimes attend or follow upon the puerperal state, as milk fever, abscesses in the breast, and phlegmasia dolens or white leg, are frequently caused by it. I believe that these latter cases have been so associated, from observing their frequent occurrence in new houses before the plan now adopted in our district was carried out."

How, then, is this enemy so subtile and deadly to be dealt with? Most sanitarians have but one reply—put efficient traps and shut out the gas.

Trapping alone, Dr. Carpenter concludes, is delusive; for not only may the trap become dry, but the water that seals it absorbs gas from the sewer, and gives it off into the house, and, if there be any pressure, the trap is forced. Neither is it of any use to say that sewers ought to be self-cleansing, that they ought to form no deposit and give off no gas. What ought to be, and what actually is in this wicked world are two very different things.

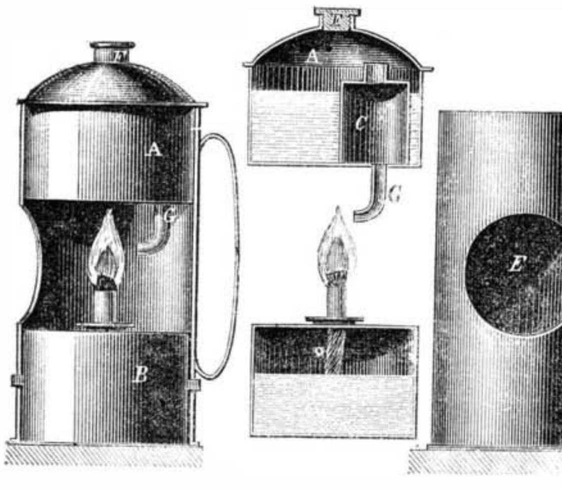
The real plan is to ventilate every sewer abundantly; to have a rapid and constant circulation of air through it; so that the sewer gas may be diluted and decomposed as soon as formed. In order to effect this, in the first place every house drain ought to be ventilated by carrying up the soil pipe to the highest available point, so that it be far enough removed from windows and chimneys. Other ventilating shafts, straight and perpendicular, ought to be put to every pipe requiring a trap, so as to protect the trap from the effects of pressure. Then, instead of closing the apertures into the street sewers, they ought to be as many and as open as possible. Stagnation in sewers, whether of solid, or liquid, or gas, must be avoided, and, considering that the sewers have a higher temperature than the air above, there is sure to be a rapid circulation through them if openings enough be provided; and public safety may be consulted by placing charcoal ventilators in the line of the up currents.—*New York Medical Journal.*



ALEXANDER'S IMPROVED WAGON TONGUE.

A USEFUL BRAZING LAMP.

A good form of brazing lamp which any tinman can construct, is shown in the accompanying engraving. It is made of copper, with the exception of the screws. The outside case is a cylinder, D, about four and a half inches high, and two and a half inches diameter, with a hole, E, as shown in the sketch; it is without ends, so that the receiver, marked A, may slide in the top, and the lamp, marked B, fit in the lower part. The parts fit together, as shown in section. The part marked A has a small chamber in the inside, with a small opening at the top. To use the lamp, the spirit lamp is fixed in the bottom of the case, the part A is filled up to the line with spirit, the lamp is then lighted, which soon boils the spirit in A, the vapor then enters the chamber marked C, and is forced down the small pipe, G, against the flame of the lamp with such force that it sends a strong fierce flame through the hole to the outside of the lamp. The outside hole of the blowpipe is to be made very small—so small that the point of a fine needle will only just enter.



Origin and Improvement of Steel Pens.

Few of the millions who use a steel pen give its origin a thought, yet there is no invention which is so universally used. During the first twenty years of this century, a Mr. James Perry was the proprietor and conductor of a popular school near London. To save himself from the drudgery of making and mending pens for scrawling urchins, he invented, in the year 1820, in imitation of the ancient *stylus*, a pen made of steel; and after many unsuccessful attempts, so far succeeded as to substitute it for the quill in the school room.

Mr. Perry, although a schoolmaster, was a keen business man. He followed up this success vigorously, and it ended in the production of the celebrated Perryan pen, known and used to this day. Mr. Perry, even in those early days, knew the value of advertising. He gave his invention a wide circulation, and in 1824, only four years after the first introduction of steel pens in Perry's school room, Robert Griffin (who is still alive) says: "During this year I wrote with pens made of steel, manufactured under the direction of Mr. James Perry—a pen that lasted about eight or nine weeks, writing about eight hours a day." In 1825 Mr. Perry employed fifty operators in London to manufacture steel pens; but although he was the inventor of the steel pen, he was not able to make them popular. That was left for a very remarkable man, namely, the still living philanthropist, Josiah Mason.

Mr. Mason, who endowed an orphan asylum a few months ago in Endenton, near Birmingham, England, with £250,000, was in his younger days a carpet weaver in Kidderminster. He, however, left that occupation and went to Birmingham, where he sold shoe-laces, pins, needles, etc., in the market place. One day he saw the Perryan pen exposed in a shop window at the moderate price of sixpence each; he bought three of them, determined to see whether he could not imitate them, and soon produced a pen lighter and better than the original. Far from taking a mean advantage in selling them to customers (Perry being then, 1830, the only maker), Mr Mason sent three dozens of his pens, mounted upon cards, to Perry, in London, offering to make them at fifteen shillings a gross. Mr. Perry, who seems to have been a liberal and shrewd business man, soon saw that a genius had got hold of the invention who could make great progress in the production. He at once accepted Mr. Mason's offer, made him small advances of money, and only stipulated that Mason should furnish him the sole supply.

Mason then began to give his whole mind to the subject. His first effort was to get the steel rolled to the proper thinness, in which alone at that time the difficulty lay. Then the machinist was called in to aid by a regular cut form what had before been shaped by hand. When Mr. Perry saw that Mason could turn out more pens in Birmingham in a day than he himself could do, with all his hands in London in a week, he thought it time to propose a partnership to Mason, which was accepted, and since Mr. Perry's death the Perryan pen is manufactured and owned by Mr. Mason, in Birmingham.

Hay Fever caused by Vibriones.

Helmholz says in *Virchow's Archives*, that since 1847, he has been attacked every year, at some time between May 20th and the end of June, with a catarrh of the upper air passages. These attacks increase rapidly in severity; violent sneezing comes on, with secretion of a thin, very irritating fluid; in a few hours there is a painful inflammation of the nose, both externally and internally; then fever, violent headache, and great prostration. This train of symptoms is sure to follow if he is exposed to the sun and heat, and is equally certain to disappear in a short time if he withdraws himself from such exposure. At the approach of cold weather these catarrhs cease. He has otherwise very little tendency to catarrhs or colds.

For five years past, at the season indicated, and only then, he has regularly succeeded in finding vibrios in his nasal secretions. They are only discernible with the immersion lense of a very good Hartnak's. The single joints, commonly isolated, are characterized by containing four granules in a row; each two granules being more closely connected, pairwise, and the combined length equaling 0·004mm. The joints are also found united in rows, or in series of branches. As they are seen only in the secretion which is expelled by a violent sneeze and not in that which trickles gradually forth, he concludes that they are probably situated in the adjoining cavities and recesses of the nose.

On reading Binz's account of the poisonous effect of quinine upon infusoria, he determined to try it in his own case. He took a saturated neutral solution of quinæ sulph. in water =1 : 740. This excites a moderate sensation of burning in the nasal mucous membrane. Lying upon his back, he dropped 4 centim. of the solution, by a pencil, into each nostril; moving his head meanwhile in all directions, to bring the fluid thoroughly into contact with the parts, until he felt it reach the œsophagus. Relief was immediate. He was able, for some hours, freely to expose himself to the heat of the sun. Three applications a day sufficed to keep him free from the catarrh, under circumstances the most unfavorable. The vibriones, also, were no longer to be found.

The experiment was made in 1867; and was repeated at the first recurrence of the attack in May, 1868, preventing the further development of the attack for that year.

Graphic Sketch of Col. Drake, the Oil Pioneer.

About a mile below Titusville, Pa., the first oil well derrick that was ever built, in this or any other country, is still to be seen. In the light that petroleum has thrown upon the world since, it is sad to reflect that the man who first bored for oil, and, by his pluck and perseverance, not only flooded a community with sudden riches, but increased the wealth of the world, died as a common pauper.

Colonel E. L. Drake first made his appearance here in 1857. Previous to that time he had been a conductor on a railroad in Connecticut. He came to Oil Creek to obtain for another person an acknowledgment of a deed from one Squire Trowbridge, living in Cherrytree Township, Venango County. Calling casually at the office of Brewer & Watson, in Titusville, he there found a bottle of crude oil, and his curiosity being excited concerning it, he learned from Dr. Brewer all facts of interest connected with its production, namely, that it flowed from natural springs on the Watson flats ; had been known to the Seneca Indians before the settlement of this region, and had been introduced by them as liniment or medicine to white persons, and sold to the druggists, and latterly had been gathered by Brewer & Watson, and used for lighting the sawmills of the firm and for lubricating purposes.

Drake visited the flats to examine the oil springs, and while there conceived the idea of boring to the sources of the oil. Returning to the East, he presented his view to a number of friends, and the result was that in the following year he came back to the oil region as the agent of an existing oil company at New Haven, who had purchased an oil tract, and Drake had full authority to bore, but very little means for the undertaking.

Drake may have got his idea from having heard that parties, sinking artesian wells for salt down on the Allegheny, were sometimes annoyed by meeting with a flow of oil. At all events, his first step was to visit the salt works near Pittsburgh, and engage experienced hands to go up and sink a well for him. A bargain was made ; but it was not kept, the honest drillers for salt concluding, after Drake's departure, that the man must be a fool who thought of drilling for oil. A second trip to Pittsburgh, in a buggy (there was no railroad from Oil Creek then), resulted in another contract, which was broken for similar reasons. Drake then made a third trip ; and finding it idle to talk of oil to men who were accustomed to regard it only as a nuisance troubling their salt water veins, he proposed to one of them to go with him and bore for salt. Salt seemed reasonable, and the man accepted his offer ; and finally, in June, 1859, ground was broken for the first artesian oil well.

The drillers wished to make a large cribbed opening to the rock, which seems to have been their usual method of starting a well. But Drake said he would drive down an iron tube instead. This plan, which his friends claim was original with him (if so, it is a pity he didn't secure a patent for it, which would have been worth a fortune to him) was adopted, and it has been in use ever since, not only in sinking oil wells but in artesian boring for other purposes. The pipe was driven thirty-two feet, to the first stratum of rock. The workmen then drilled thirty-seven feet and six inches farther, entering what is known as the first sand rock, and making a total depth of sixty-nine and a half feet. They were at this point, when, one day—August 28, 1859—as the tools were lifted out of the bore, a foaming, dingy fluid, resembling somewhat, in appearance, boiling maple sugar, rushed up, and stood within a few inches of the top of the pipe. It was oil. In the meanwhile Drake had great difficulties to overcome, and greater were before him. There was still no railroad in that part of the country, and all his machinery and apparatus had to come in wagons from Erie, a distance of forty miles. He had to send to Erie for everything—once for a pair of common shovels, the store at Titusville being unable to furnish them. He had soon spent the money advanced to him by the company, and it refused to advance him more. He had exhausted his credit, too, and could not get trusted for the value of an oak plank or a center bit. He was thought insane, and people called him "Crazy Drake." His workmen were unpaid and discontented, and his enterprise must have failed when on the very verge of success, had not two gentlemen of Titusville, worthy of mention here—Messrs. R. D. Fletcher and Peter Wilson—having faith in the man and his work, come to his assistance. They indorsed his paper and loaned him money—and with this timely aid he struck oil.

Yet even now, with his well in operation, pumping twenty-five barrels a day, he seemed to be getting deeper and deeper into difficulty. He found, as he afterward said, that he had an elephant on his hands. There had been a demand for oil, at a good price, in small quantities, but there was no demand for it in large quantities. Imitators followed him, other wells were sunk, and the market was flooded. Teamsters charged $10 for hauling a barrel to Erie, where it could not fetch $10. The oil could not be generally used as an illuminating agent without being refined, and the coal oil refiners refused to touch a rival production, whose success in the market would be likely to injure their interests. Drake's health, if not his spirits, gave way under these complications, and he returned to the East about the time when petroleum —first refined by James McKeown and Samuel Kier, of Pittsburgh—was coming into general use. The great oil excitement came too late for poor Drake to profit by it. He died recently in a Connecticut poor house.

MALLEABILITY AND DUCTILITY OF METALS.

LECTURE BY JOHN ANDERSON, C. E., AT THE SOCIETY OF ARTS, LONDON.

In order readily to understand the two remarkable properties of malleability and ductility, which are now turned to such good account in almost every branch of the mechanical arts, it will be convenient to think of the malleable or ductile metals, such as lead, tin, copper, wrought iron, and steel, as substances that can be moved about like dough, that can be spread out as with a roller, that can be elongated by drawing out with the hands, that can be squirted through a hole by presssure like macaroni, or even that the dough can be pushed or gathered back again into its original mass of dough—that is, if proper means are employed to perform the operation gently, and this may be done without breaking the continuity of the particles of which the mass is composed. Such a statement may well seem fabulous, but it will be my province now to enumerate many things in connection with metal much more wonderful than what I have said regarding the dough, and even more strange than the change in dough when overtaken by the biscuit state from the baking process.

It is difficult to understand the possibility of the malleable and ductile properties without fully realizing that their particles are fluid, in a certain sense, and that this is due to the molecular arrangement, not so fluid, as water, tar, or bitumen, but still a fluid which will flow in obedience to sufficient pressure, and just as those fluids require time when acted upon by gravity, so the metals require greater time and more force than gravity, the rate of flow being determined by the nature of the metal, the softer metals requiring less pressure and flowing faster than the harder ; and in the case of steel the flow is extremely slow, but with pressure, time, and patience, it also may be overcome and made to flow gently into any shape or form while in the solid condition.

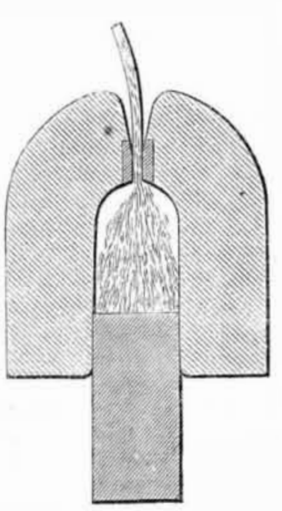
For a number of years the flowing property of the softer solid metals, such as lead and tin, has been taken advantage of very extensively, in the squirting of pipes and otherwise ; and for thousands of years the malleable and ductile metals have been under treatment by man, and a vast number of facts have thus been accumulated ; but it is due to M. Tresca, of Paris, to say, that he has done more, perhaps, than any other man in regard to the investigation of the natural laws by which the flow of solids is governed under varying circumstances, and the most interesting point of all is the great similarity that exists between the flow of solid metal and that of the flow of water—that in the flow of solids from an orifice there are the same converging currents, eddies, and that the quantity of metal issuing is dependent on the same conditions as water when issuing from orifices of different arrangement, and only differs in degree.

From time immemorial man has been familiar with gold as a flowing metal, both as malleable and ductile. It is in consequence of these properties that gold may be beaten into leaves so thin that it takes two hundred and ninety thousand to make one inch in thickness, or it can be drawn into a wire so fine that an ounce weight would extend a distance of fifty miles. The flowing action which takes place in coining a sovereign or other coin is very apparent. This process is not the mere stamping which it is generally considered to be, but the particles of the gold have really to flow in the same manner as a liquid, from one part of the die to another, in order to fill up the deeper recesses of the die from from the shallow part of the space, and so form the perfect coin from the rush of gold penetrating everywhere. As, however, gold is not one of the most common metals of applied mechanics, its presence in the workshop is less seldom met with than some of the others which have been already enumerated.

The metals lead and tin are both malleable and ductile, but their malleability, or spreading-out property, is much greater than their ductility, or drawing property ; and both being soft, and having the flowing property in a pre-eminent degree, they can thus be squirted or rolled to any extent, or into any form of pipe or sheet, so that the want of ductility is scarcely felt.

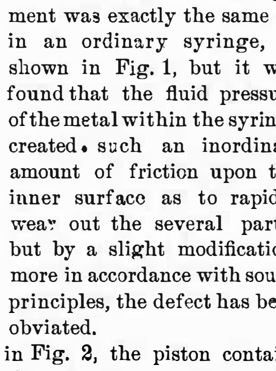
The diagram (Fig. 1) will explain the nature of apparatus which is employed to squirt these metals when in the solid state. It is a powerful syringe filled with solid metal, with pressure on the piston varying according to the dimensions ; in some the force required is two thousand tuns. In the earlier machines the arrangement was exactly the same as in an ordinary syringe, as shown in Fig. 1, but it was found that the fluid pressure of the metal within the syringe created such an inordinate amount of friction upon the inner surface as to rapidly wear out the several parts ; but by a slight modification, more in accordance with sound principles, the defect has been obviated.

Fig. 1.



In the arrangement shown in Fig. 2, the piston contains the orifice, and in pressing against the upper surface of the metal, causes it to remain in a state of rest within the containing vessel ; but as fluid pressure is equal in every direction, the solid finds the orifice as a point of less resistance, hence it flows outward in a continuous stream, thereby avoiding the friction of the solid lead within the cylinder. It will thus be observed that a rod of lead or tin can be squirted of any form or dimensions, depending on the die or orifice. In the Royal Arsenal may be seen lead thus squirted into continuous rod, and then wound upon reels like yarn, to be again unwound and made into bullets by self-acting compressing machinery ; but the whole of the several processes are entirely due to the flowing property. Man's mechanism is very subordinate, and may be varied to any extent as circumstances may require.

Fig. 2.



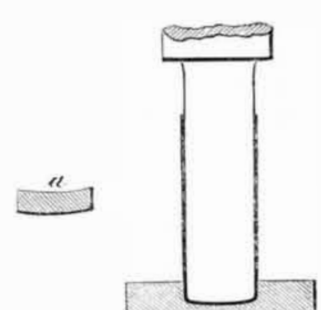
Pipes are made with the same facility as rods, by the mere insertion of a steel pin, the size of the required bore, placed in the bottom of the cylinder, and exactly in the center of the orifice, thus forming an annular space through which the metal flows outward as a continuous pipe ; or, by making this pipe of sufficiently large diameter, and then cutting it open by a stationary knife as it leaves the machine the pipe becomes a sheet of lead, which, by means of suitable rollers, may be wound on a reel as a long web of sheet lead, or the sheet lead may be rolled out by rollers. In both ways the same mechanical work has to be done ; the respective friction is a disputed point.

A very singular result was obtained by an attempt to squirt brass pipes, which are extensively used as steam boiler tubes and for gasfitting purposes. This brass consisted of 60 parts of copper and 40 parts of zinc, and of various other proportions, but, singular to relate, the pipes so squirted were zinc rather than brass ; the most of the copper remained in the vessel and refused to flow. We are not to infer from this that the copper would not flow, but rather that the union between the zinc and the copper was less than the pressure necessary to make the copper flow ; the mixture may have been more mechanical than chemical, or the temperature may have been such as to have had the zinc too near its melting point. Whatever is the explanation, the subject is well worth further experiment. In any such operation, the nearer the lead or other metal is to the liquid state, the easier it is accomplished ; but it must be solid.

Lead or tin may be rolled out to any extent, either singly or both combined, or with a thin coating of tin or other metal upon one or both sides of the lead, so as to have a leaden substance, but yet covered with a tin surface, perhaps not thicker, if so thick, as the leaf called tinfoil, thus combining economy, with scarcely any disadvantage, for many purposes.

A beautiful illustration of the flowing property of tin is shown in the manufacture of the German capsule, in which the paint for artists is made up for sale and use. A button of tin, as in Fig. 3, is laid in the recess of a die in a fly press ; a corresponding punch or die, a little smaller, is then brought down upon it with a smart blow, thus leaving, from the difference of dimensions, an annular space between them, when the metal at once squirts upward like water, but at a velocity much faster than the eye can follow, thus converting it into a perfect capsule. The form of the punch and die depends upon the article to be made, but in all provision has to be made for the admission of the atmosphere on the removal from the dies.

Fig. 3.



From these remarks it will be seen that, by understanding a few of the natural properties of these metals, how completely they are under man's control, and, by knowing the simple laws, he can modify the apparatus in thousands of different ways, in order to produce whatever may be required.

Correspondence.

The Editors are not responsible for the Opinions expressed by their Correspondents.

Speculative Moonology.

Messrs. Editors:—The idea that the full moon is hot seems to me so unscientific, that, though advanced or advocated by all the Herschels and backed by the Rosse reflector to boot, I take the liberty of offering a reason or two which may go to prove it untenable.

The convexity of the moon's surface is so much greater than that of the earth, that the moon must be effected by the sun's heat less than the earth is by a proportion considerably less than the ratio of size or diameter between the earth and moon would seem to indicate—nearly all the heat being deflected or reflected into space and dissipated. (And this convexity is possibly the cause of so little heat being reflected directly earthward.) The sun's rays can have but a small spot—small, as compared with the earth in this respect—on which they can at any time be said to fall vertically ; a much less distance being required there than on the earth to reduce them to rays falling through all degrees of obliquity down to horizontal. So the vertical and nearly vertical rays may move around the moon quite slowly, and yet heat but at most a tropical belt, while there would be temperate and frigid zones as on the earth. But it would be doubtful whether that belt could by any possibility reach a temperature of 492° as claimed by modern astronomers.

All this, supposing the moon has all the conditions and requirements which the earth possesses for rendering sensible the solar heat ; but the first and principal one of these is an atmosphere and astronomers tell us the moon has none at all ; and without the atmospheric lens to contract the sun's rays together and squeeze out the heat, how, and from whence is free caloric to be obtained ? On the earth it is known that at a certain hight, where (and because) the air has but little density, snow never melts, even under the tropics ; whence we may infer that at greater elevations and with air still more rarefied, ice and snow would remain unmelted even if exposed to the rays of an equatorial sun for a century—and with no atmosphere at all it would be still colder than with a little.

It is stated that the addition of a small per centum of a denser gas (carbonic acid) to our atmosphere or increased