power, by means of which from five to twenty bushels of the insects are easily taken in a day. When brought to the designated receiving places, they are immediately paid for and buried in a deep trench. Blue Earth county has already bought fifteen thousand dollars worth.

Now, who will invent a use for these millions of collected insects? There is an enormous fortune in the invention, and it seems a waste to dispose of them by simple burial. Will they not yield a coloring matter, or an oil? Desiccated and ground, would they of any use as a fertilizer? Cannot some of our chemical readers experiment and favor us with results?

Correspondence.

The Keely Motor Deception.

To the Editor of the Scientific American:

I was much pleased, as I have no doubt most of your readers were, with your recent able articles on the Keely motor, and which, I am sorry to say, are the only ones (that have yet appeared) calculated to expose to the public the deception of this so-called invention. All the other articles in the daily papers on the subject that have come under my notice have evidently been written to mislead persons, ignorant of scientific subjects, into investing their money in, or rather throwing it away upon, this chimera. Whether these articles were paid for or not, I am unable to say; but they certainly could not have been better advertisements.

The most remarkable feature of this deception is the endorsement it has received from such men as Haswell, W. W. Wood, and others, and which, I believe, has done more to bring the scheme into favorable notice than anything else. It is true that their expressions of opinion, so far as they are made public, are very guarded, and do not absolutely amount to anything; yet the fact of their names being associated with the invention in any but an antagonistic manner amounts to a tacit endorsement of the statements made by the promoters. The hallucinations of otherwise shrewd business men are not so extraordinary, as they must of course base their opinions on those of men conversant with the subject; and when these go astray, it is but a natural sequence that the capitalist should also. This was notably the case in the Ericsson engine bubble, first exposed, I believe, in the SCIENTIFIC AMERICAN.

The "confidential" pamphlet, got up by the Keely Company, contains probably the greatest percentum of the chaff of verbiage, compared with the wheat of fact, of anything yet published. The "experiments" therein and subsequently reported give neither a statement of facts on which to base any calculations, nor an explanation of the theory by which the power is produced. In the absence of both theory and fact, it is impossible to show, in a logical manner, the fallacy of an invention; and in this lies the unassailable position of the company, which can only be reached by generalizations. If the publicity which the company is evidently anxiously to give to the invention is not injurious to its interests, I, in common with many others, cannot see that they would be in any way jeopardized by Mr. Keely coming forward and informing us (without communicating his secret) what the nature of his invention is. Has he invented a costless method of decomposing water, or has he discovered a new element?

I may mention that I have made two attempts to go to Philadelphia, at my own expense, and see the engine in operation; but on both occasions it was either "dismantled" or not ready for public inspection, though there were, I believe, a few more shares left for those desiring to invest.

New York city. ARGUS.

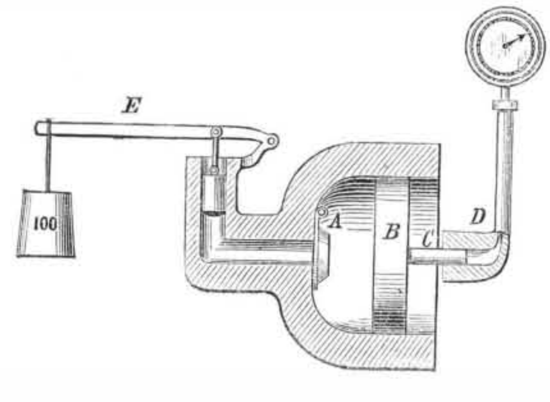
The Keely Motor.

To the Editor of the Scientific American:

You are doing the public valuable service in exposing the Keely motor humbug. Not a week has passed during several months but one or more innocent enthusiasts have inquired: "What do you think of the Keely motor? Isn't it wonderful?" Wonderful indeed; Aladdin's lamp in the older, and the woolly horse in recent, times were not more so.

The motor is said to have generated a pressure of 10,000 lbs. per square inch, which appears to the uninformed to be unprecedentedly high; but it is in reality only a moderate one. In an article in the SCIENTIFIC AMERICAN of May 2, 1874, is an account of a pressure forging machine which worked at a pressure of 19,480 lbs. per square inch. Pontifex & Wood, of London, England, once informed the writer that, in making lead pipe, they employed a constant pressure of 17,000 lbs. per square inch. Messrs. Harding of London, England, produced in 1865 sufficient pressure to weld steel ingots together cold, the weld being equal in strength to the solid metal. Mr. Dudgeon will supply any one with an hydraulic jack, which, by interposing a piece of steel ½ of an inch square between the ram and the duty, will exert far more than ten or twenty thousand pounds per square inch. Here is an hydraulic pump:

A is a cylinder, say 5 inches in diameter, provided with a piston, B, the piston rod, C, of one square inch sectional area, acting as a ram in the barrel, D, attached to the pressure gage. E is a lever, say 50 inches long, attached to which (and 2½ inches from the end) is a pump plunger of a sectional area of a square half inch. Now supposing a boy to exert a force of 100 lbs. on the end of the pump lever, he could pump a pressure on the gage of 156,800 lbs. per square inch, if the various parts were strong enough to stand it. Of course in the absence of any air or other elastic fluid, the least motion of the piston, B, would destroy the pressure; in the case of attaching an air receptacle of any kind, and suddenly releasing it after the pressure was obtained, an expulsion of the same nature in every respect as those made by the Keely motor may be given, the length of duration of time of the expulsion being in precise ratio to the quantity of air contained in the air receptacle. That this, in effect, is what Keely virtually accomplished is proved by the acknowledged



fact that his motor consists of chambers containing air and water, the initial pressure being the 26¼ lbs. per square inch supplied by the hydrant, which would of course compress the air (without any mechanical aid whatever) to the same pressure, the space of time necessary to do so being in proportion to the quantity of water passing into the motor, and the quantity of air to be compressed. If the cubical contents of the air space are very small, as would appear to be the case, from the small amount of time necessary to charge and exhaust the motor (as certified to by the operators themselves), a very short time would suffice to obtain the full initial pressure.

Then there are any number of devices by which a cubic foot of air, at a pressure of 26 lbs. per inch, could be compressed into 4 cubic inches of air at a pressure of 11,232 lbs. per inch, which, applied to a small model engine (having a very small conducting pipe so as to wiredraw the compressed air, and cutting off the air supply at one twentieth of the stroke) would run it at a very high velocity for several minutes, as was done in the Keely trial.

If Mr. Keely has anything to exhibit as a force generator, and wishes to demonstrate that it will develop power, let him place a water meter and a pressure gage on the supply pipe *while it is feeding the motor*, and let there be a section of gage glass in the supply pipe, together with a small cock attached, so that visitors may ascertain what amount and at what pressure the liquid, be it water or otherwise, passes into the motor, so that they may see through the glass the appearance of the material, and (by means of the cock) draw off from time to time some of the entering liquid for examination; then let the motor drive a friction pulley, to which a brake is attached in the usual manner, to serve as a dynamometer. Thus we may ascertain what enters and leaves the motor in the form of power, neither of which conditions are complied with in the present exhibitions, neither of which conditions would interfere with a perfectly maintained secrecy as to the nature, design, or mechanical arrangement of the motor, and neither of which conditions can be dispensed with if a fair exhibit is to be made.

I am only astonished that any engineer can be found to certify to the generation of a cold vapor or gas, having unknown qualities and an enormously expansive energy, without taking one step toward definitely ascertaining, by measurement or otherwise, what entered and escaped from the device. It is true these gentlemen certified to little or nothing; but under color of their names, an unmeaning exhibition of hydraulic compression and re-expansion has been foisted upon the unmechanical public as a force generator, to the scandal of the whole profession of engineering.

New York city. JOSHUA ROSE.

The Bastie Glass.

To the Editor of the Scientific American:

So many exaggerated and untrue statements have been made in journals at home and abroad concerning the new glass (called, from its maker, the Bastie glass) that it is the duty of someone to quiet the fears of manufacturers and dealers, who have thought that their occupation was gone and a revolution in their business imminent, by giving the true facts in the matter. Let me first make a few quotations from the journals, and then give the truth, as we understand it, from seeing the article and hearing an explanation of its properties.

It is called "malleable," or "almost malleable," and "unbreakable." It is said to be "annealed" in some oleaginous bath. It is said that "its fragility is diminished, while its transparency remains the same." It is stated that it can be polished, and cut, and engraved by the sand blast, wheel, or acid, just like ordinary glass. Finally, we read that "we may expect that glass will supersede the use of metals for household and manufacturing purposes."

I am aware that all these statements are not authorized by De La Bastie; but they have been so widely spread in the newspapers that many believe them, and interested parties ask each other: "Are these things true? Have we indeed malleable glass?" etc.

As the objective point of the whole business is, I suppose, the sale of the patent in America, for which millions are asked, it is well that a more correct account of the glass should be given.

1. The glass is not malleable, and is not claimed to be so by the inventor. Malleability and brittleness in glass are incompatible; and only in the fabulous stories of ancient and modern writers is malleable glass named, and its possibility was, I think, never allow by any practical glass maker.

2. The glass is not unbreakable. It is only much tougher than common glass, and will bear a much stronger impact. But there is no piece which cannot be broken, and many specimens are purposely fractured at every exhibition.

3. It is not annealed. It is only tempered, toughened' or hardened, by its submersion in the hot, oily bath.

4. It cannot be cut and engraved like ordinary glass. Flint and other glass can be ground and cut on the wheel or by the sand blast throughout its entire thickness. Now, although a few specimens exhibited were ground by the sand blast to a very slight depth, yet, if the blast goes beyond a certain depth, it will break into a thousand pieces, just as a Rupert's drop is shivered when ground. I am telling you a fact, for I have in my possession a piece of the fractured glass as it came from the sand blast after being ground, perhaps through a third of its thickness, or about $\frac{1}{32}$ of an inch.

5. It does not preserve its transparency after its transformation by tempering, as most of the specimens exhibited were only translucent. The glass is thus robbed of one of its chief beauties, rendering it unfit for any use where clearness and transparency are required.

6. The glass cannot be cut with a diamond, making it of little or no value for window glass or photographic uses, both of which purposes frequently require the pieces to be cut more than once before exactly fitting the frame or the window sash.

I add, after the above statements, that it cannot supersede the use of metals. Can I call it anything more than an enlarged Rupert's drop, exhibiting many of its optical and crystalline properties? It is a great scientific curiosity, just as the Rupert's drops were 200 years ago, and has excited no more discussion than they did. Hundreds of pages were written upon them, and some of these drops were tempered in oil instead of water, and did not break as the others did. More than half a century ago, a writer in the "Gentleman's Magazine," in an article on tempering glass, gives this direction: "If the glasses are to be exposed to a higher temperature than that of boiling water, boil them in oil." These are curious facts.

I ought to say that, in my opinion, it would not yet be safe for glass makers to throw stones at those who pass. for the impact of a stone, as generally thrown, would break any windows, even of the Bastie manufacture; and although, ordinarily, a saving is made in the squares cut from fractured pieces of window glass, the Bastie article is shivered into the minutest fragments, and entails a total loss. A stoneware baking dish, if broken in the oven, would not necessarily spoil the loaf of cake it contained; while the accidental fracture and explosion into minute fragments of a Bastie article might ruin the contents of the oven, as ground glass forms a very dangerous article of food.

May I add that, before your readers take stock in the Bastie process, it would be well to consult the agents of other processes of a similar character, which are now represented in New York or in Europe? If the papers are to be belived, Baur in Vienna, Pieper in Dresden, Stahl in Berlin, and Meusel in Geiersthal are busy with their processes of tempering glass.

While I do not wish to say, in these times of wonderful discoveries and inventions, that anything cannot be done, yet I think that our glass makers and dealers can still possess their souls in peace, and not lose their temper over the Bastie or any glass yet made, as being likely to make a revolution in their business.

Although formerly a glass manufacturer, and for many years a glass dealer, I am not interested in any tempering process, or glass business of any kind, and only write in the interests of scientific truth and accuracy. When M. De La Bastie, or any other man, can make glass which is malleable, as unbreakable as iron or tin, and tough, and is also transparent, which can be cut with a diamond, and cut and engraved deeply on a wheel, just like Baccarat's glass or that of Bohemia, we will not say "don't" to those who want to take stock. GLASS.

Powder Mill Explosions.

To the Editor of the Scientific American:

When a powder mill explodes, the men at work are unable to explain its cause; this leads me to think that such calamities may be caused by electricity. At all events it is a well known fact that persons dressed in woolen clothing for the body and leather shoes for the feet can, when the air is dry, by moving and twisting their bodies so their clothing will rub against them, produce from their finger ends a spark of electricity sufficient to ignite a gas jet. Can it be that the men who work in powder mills, dressed as above described, in preparing for their work, create so much electricity in their bodies that, when their hands come in proximity with any metal, a spark is given off, which, even if insufficient in tension to explode the powder, may ignite some inflammable gas generated from the chemicals? The powder is exploded, the mill goes up, and the people cry "spontaneous combustion." C. F. ROBERTS

Cottonwood Springs, Neb.

A Method of Destroying Grasshoppers.

To the Editor of the Scientific American:

I wish to suggest a cheap arrangement which, I believe, could be effectively used for the destruction of a swarm of grasshoppers. The instrument is a tin cylinder about five inches in diameter, flattened so as to be elliptical in form, and about ten inches in length. One end is closed completely, but it has a socket into which is fitted a stick or broom handle; the other end is shaped like a grocer's scoop. At the extremity of the cylinder, where the bevel of the scoop commences, is a sliding door of tin, which, when shut, closes the cylinder entirely. Across the base of the scoop and immediately in front of the door is a groove; into it is fastened a piece of lamp wick saturated with alcohol. The cylinder is filled, through the sliding door, about one third with powered rosin; the door is then pushed down until only a small space or slit is left, about ⅛ inch or sufficiently to allow the powdered rosin to trickle in a shallow stream over the ignited alcohol, whenever the instrument is held at an angle downwards. The whole thing should cost about $1. When the instrument is held by the handle in a nearly upright position, the rosin will not burn; but directly it is lowered, as in the act of striking, a flame will issue of the width of the cylinder and three or four feet long; and this flashing can be repeated in quick succession as often as the instrument is raised and lowered. Three or four men thus armed could in an hour traverse a large lot of planted corn. The sudden flash, directed to the corn, would be too brief to wither the plant; but it would spoil the appetites, legs, and wings of a mass of grasshoppers. It may be found necessary to mix the rosin with a small quantity of fine gravel or sawdust.

Omaha, Neb. CHARLES PONTEZ.

PRACTICAL MECHANISM.

BY JOSHUA ROSE.

NUMBER XXVI.

LATHE CHUCKS.

That class of lathe work which, by reason of its shape, cannot be held and driven between the lathe centers, is what is termed chucked, that is to say, it is fastened to the face plate of the lathe by suitable plates and bolts, or held in special chucks. Of special chucks, the universal chuck is the the most useful, and is so common that a description of it is unnecessary. When the running center of the lathe is removed in order to put a chuck on the spindle, the hole into which the center fits should be carefully plugged with either rag, cotton waste, or paper, to prevent the metal turnings or dirt from getting into it; and the screw on the lathe spindle and the face of the collar at the end of the screw should all be carefully wiped, as should the face of the hub or boss of the chuck, since the presence of any dirt there will cause the chuck to run out of true. When the chuck is removed from the lathe, it should be put away standing upright and not laid flat upon its face, in which position dust would accumulate in the thread.

If a piece of work requires to be operated upon at a distance from the face of the chuck, a universal chuck will not hold it sufficiently firmly; and the bell chuck, shown in Fig. 91, should be brought into requisition. In using this

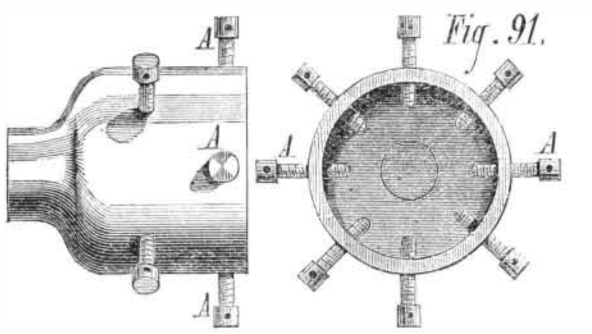


Fig. 91.

chuck, is best to set it the work as nearly true as possible, using the front screws, A A, before attempting to adjust the four back screws, and to set the work true near the front face of the chuck, striking the work with a mallet (on the end standing out farthest from the chuck) to true it; and then, when the work is adjusted as nearly true as possible, to set up the four back screws, until they each bear lightly upon the work, and then tighten them gradually and successively, giving them not more than a quarter turn each at a time, and continuing from one to the other until they are finally screwed sufficiently tight, which proceeding will prevent the springing of the work by the screws. The bell chuck will hold work very firmly, and obviate the necessity (in most cases) of a guide or cone chuck being placed upon the outer end of the work to steady it.

The screws should be made of steel, the ends being turned down below the depth of the threads, so that, if in the course of time the ends should bulge from the pressure of the screws, it will nevertheless be an easy matter to remove

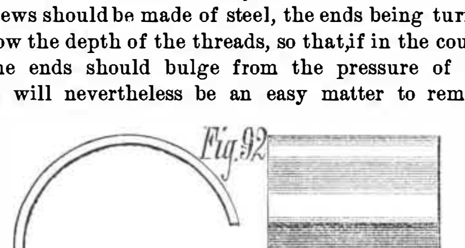


Fig. 92.

them from the chuck, to replace them when necessary, or to straighten them if they become bent, as is sometimes the case. To prevent bulging, the ends should be tempered to a straw color. When tubes, brass work, or finished work, which is liable to be damaged by the pressure of the screws, is held in a bell chuck, a piece of soft metal, as copper or brass, should be interposed between the screws and the work; and here it is as well to remark that the same precautions should be taken in fastening a carrier, driver, or dog to work driven thereby. Pieces of copper, both flat and of circular form, such as shown in Fig. 92, should be kept for this especial purpose. The object of leaving a space between the two ends is to allow them to close, when required for work of a smaller diameter than the ring of copper, it being obvious that the same piece can be opened or sprung outwards to accommodate work of a larger diameter. To hold rings or hollow work larger in diameter than the bell chuck, the screws may be inverted, that is, put into the chuck with the heads inside and the ends protruding outside the chuck; it is, however, at times difficult in such cases to obtain access to the heads of the screws, but whenever this can be done, the bell chuck will be found a most effective and serviceable tool. A special implement should be kept for inserting into the holes of the heads; for if promiscuous pieces of steel are used, they will destroy the screws by bulging outwards the edges of the holes, making them taper and causing the lever to slip outwards and away from the screw head. Such an implement is called a "Tommy," and is shown in Fig. 93;

Fig. 93.

it is made of round cast steel and left soft, the sizes of the ends, A and B, being made to fit the holes in the screw heads. The object of curving the end, A, at C, is to enable the end, A, to be used in instances when the end, B, could not be employed, by reason of some obstruction or interposing projection upon the work.

The next form of chuck to be considered is the dog chuck; and of this there are two kinds, the first being one in which the screwing inwards or outwards of one dog operates one or more of the others, by means of gearing or other suitable devices, and the second being those in which the dogs slide in grooves or slots in the chuck plate, and are adjusted to accommodate the work and then bolted firmly to the chuck plate, the work being held by screws passing through the jaws of the chuck.

The first kind of chuck is a very useful tool for ordinary work, and is a necessity to every lathe; but however well it may be made, and no matter how carefully it is used, it will become in time out of true and unfit for work requiring great nicety. For work which does not require reversing in the chuck, it is of course at all times good; but if the work does require reversing, the jaws of the chuck will require adjustment to keep them true; and since such jaws are hardened they cannot be turned up in their places unless they are first removed from the chuck and softened. There can be no doubt that, in a majority of causes, ill usage causes these chucks to get out of true rapidly; and a common reason for their depreciation arises from the following causes: The jaws are, of necessity, adjusted to fit the slots or grooves in the chuck plate with great exactitude, after the manner shown in Fig. 94, A being a jaw to which is secured a sliding fit in the slot of the plate by means of the plate and nut, C and D; from which it will readily be observed that the presence of any dirt upon the face plate will make it very difficult to move the jaw either towards or away from the center of the chuck, and that even the absence of sufficiently frequent lubrication will produce the same effect, because the dust and fine particles of metal collect upon and in the grooves of the chuck, and form a species of gum coating not unlike india rubber, forming a serious obstacle to the movement of the jaw. Instead of properly cleaning the chuck, to obviate the difficulty, the artisan, especially if his job is in a hurry, is apt to slack back the nut, D, thus causing the jaw to fit loosely to the thickness of the chuck plate, so that, when the jaw is forced against the work, it springs away from the face of the plate in the direction shown in Fig. 95, the amount to which the nut is loosened determining the degree to which the lower end of the jaw will spring away from the chuck plate in cases where the work is being held by the inside face, E, of the chuck. If, however, the outside face, F, of the jaw is gripping the work, the jaw will spring in the opposite direction, so that the lower end of the jaw (shown above to be away from the chuck) will be close to it, and the outer end will spring off, the conditions of pressure being exactly reversed. It will be at once perceived that the wear of the face of the jaw and of the face of the plate, C, which fits against the face plate, B, will, if not taken up by the nut, produce in time the same defect; and it is this wear, together with that of the screws, nuts, and gearing, if there be any, to operate the screws, which causes this class of chuck to get out of true, even if carefully used.

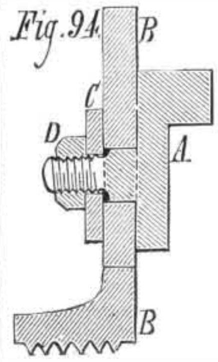


Fig. 94.

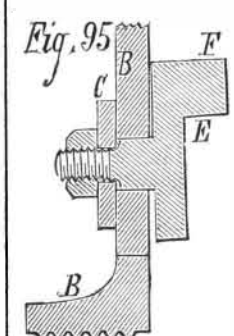


Fig. 95.

Many cases arise in which it is necessary that the inside face of a piece of work requires when chucked to bear against the face plate if the jaws grip at F, and against the face of the jaw if the jaws grip the work at E, so as to ensure the work being set true with that face. When, however, the jaws of the chuck are loose in the slots or slides, as shown in figure, tightening the jaws upon the work will force the latter away from the face plate to an amount proportionate to a degree of looseness of the jaw, as is shown in Fig. 96, in which the lines, A A, represent the direction in which the inside face, E, of the jaws would stand to the chuck when gripping the work, and B B the direction of the same when the outside face, F, is gripping the work, the effect being, in both cases, to spring or force the work away from the face of the chuck jaws as the case may be, rendering it very troublesome to set the work true, and entailing a great loss of time; for a very slight defect in a chuck is, by reason of reversing the work in the lathe, multiplied upon the work; and when it is considered how many times in a year that defect is encountered, how many times it has performed its duties imperfectly, and how much extra labor in fitting and adjusting has become necessary, it will be readily perceived that it is better to throw away a dozen imperfect chucks, if needful, to obtain a good one.

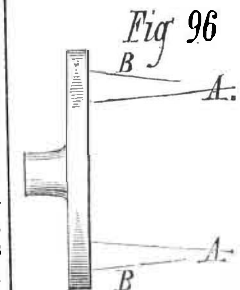


Fig. 96.

Chuck dogs are detached dogs which fit into the square holes of the chuck plate or face plate, as shown in Fig. 97, being held to the plate by the nut and washer. These dogs are movable to any part of the plate, their position being regulated to conform to the shape of the work, which renders possible their employment in cases where a dog chuck would be of no service, such, for instance, as holding a triangular piece of work. The center line of the screw should stand exactly parallel to the face of the face plate, or tightening the screws, which in this case grip the work, will force the latter towards or away from the face of the plate, according to the direction in which the screws are out of true. The screws should have their ends turned down below the thread, and should be hardened as directed for bell chuck screws, since these screws may be also reversed in the dog for some kinds of work. The dog should be screwed very firmly against the face plate, so as to avoid their springing.

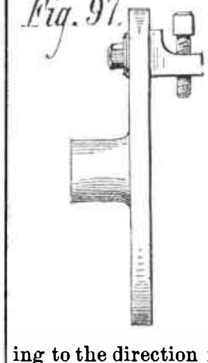


Fig. 97.

Universal or scroll chucks, containing screws or gear wheels which are enclosed, should be occasionally very freely supplied with oil, and the chuck worked so as to move the jaws back and forth to the extreme end of their movement, so as to wash out any particles of metal or dust which may have lodged or collected in them; for proper cleaning will reduce the natural wear to a minimum, and prevent the internal parts from cutting, as they are otherwise apt to do.

SCIENTIFIC AND PRACTICAL INFORMATION.

A NEW USE FOR MAY BUGS.

Dr. Chevreuse, of Switzerland, announces a new and curious utilization of the may bug or cockchafer. It consists in decapitating the living insect one hour after it has fed, when, on opening the stomach, several drops of a colored liquid are obtained, which varies with the nature of the plant fed upon. This substance has been used as a water color for painting with considerable success, Dr. Chevreuse having formed a scale of fourteen different tones or shades. It is a permanent pigment, unalterable by air or light, and imparts this quality, it is stated, to other paints with which it may be mixed.

A CURE FOR SOOTY CHIMNEYS.

F. C. R. says: About fifteen years ago, a dwelling was raised one story higher, and a chimney had also to be raised some feet higher; and as the chimney was built up, it was plastered on the inside with salt mortar, to prevent the adhesion of the soot. The result is that the part plastered with salt mortar is white and clean to this day, while the other part gets filled with soot up to the very line where the salted part begins, and has to be cleaned each year, the chimney being in almost constant use. The proportions used were 1 peck of salt, added while tempering, to 3 pecks of mortar.

A NEW GENERAL ANTIDOTE FOR POISONS.

M. Jeannel gives the following formula for an antidote for a number of deadly poisons: Solution of sulphate of iron (D. 145) 100, water 800, calcined magnesia 80, washed animal charcoal 40. These ingredients are kept separate, the solution of sulphate of iron in one vessel, the magnesia and charcoal in another, with some water. When needed, the sulphate solution is poured into the last mentioned receptacle and violently agitated. The mixture should be administered promptly in doses of from 1·6 to 3·3 ounces. From experiments M. Jeannel finds that this antidote, employed in proper proportions, renders preparations of arsenic, zinc, and digitaline completely insoluble. It does not render oxide of copper absolutely insoluble, however, and leaves in solution notable quantities of morphine and strychnin. It neither decomposes nor precipitates cyanide of mercury nor tartar emetic. It saturates free iodine entirely, and acts but partially upon solutions of alkaline hypochlorites. Four ounces of the antidote are found to neutralize the poisonous effect of 1·6 ounces of arsenite of soda. It retards the toxic action of sulphate of strychnin, affording sufficient delay to administer evacuants. One third of an ounce is efficacious against digitaline injected into the intestines. The formula, says M. Jeannel, is certainly preferable to the officinal hydrated peroxide of iron, which, in course of time and at a temperature of 59° Fah., undergoes molecular modifications which render it unreliable as an antidote for arsenical preparations.