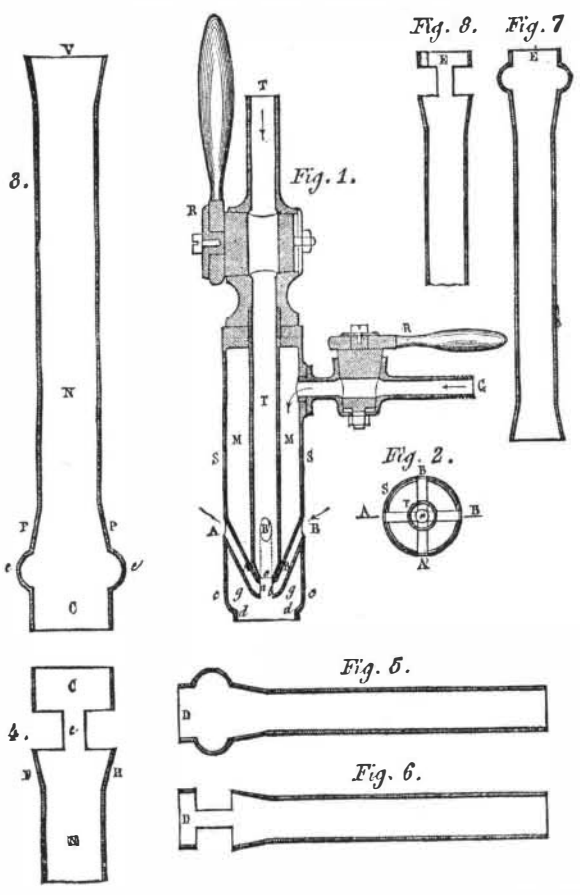
stirred together until the two substances are completely mixed, and then, considerable pressure being exerted upon the pestle, they are rubbed until the resin adheres to the filings in a very fine coating. The filings can then be sprinkled as usual, and the curves formed. It is best (after the curves are formed) to heat the plane surface (glass, paper, or wood, according to convenience) over a stove or in an oven, which easily allows it to be sufficiently as well as uniformly heated. For projecting the curves on a screen, the following, we believe, is a very effective method: Cover the glass with thin gum water, allow it to dry perfectly; obtain the curves on dry gummed surface; finally, breathe on the plate; the gum is thereby softened, and the curve permanently fixed. Substituting correspondingly shaped pieces of paper for the magnets (a pinhole can be used to indicate the north pole), the curves can be covered with a second plate of glass, and thus preserved as an ordinary lantern slide.

A NEW GAS BLOWPIPE.

The apparatus herewith illustrated, in natural size, is a new gas blowpipe burner, designed also for forges and for similar uses where intense heat is necessary. The advantages of the invention are that, when the air blast is supplied by water pressure, it insures the delivery of sufficient air completely to consume all the gas, and in a thoroughly dry state so as not to cool the flame.

The device, as shown, consists of a brass tube, T, to which the air blast is led, and which is screwed in an outer tube, S, which receives the gas from the pipe, G, the gas filling the annular space between the two tubes, and being regulated by the cock, R'. Cock, R', governs the air supply. The orifice, *o*, of the air tube terminates just within the interior of the tube, S. In order to augment the quantity of air injected into the gas, four copper pipes, A A', B B', are inserted in S, and are so arranged that the current is drawn into that leaving the tube, T, at *o*, mingling with the latter, and so filling the annular space, *g*, and escaping at *d*. A plan view of the tubes, A A', etc., is shown in Fig. 2.



To the orifice, at *d*, various mouthpieces, some of which are shown in Figs. 3, 7, and 8, may be attached. Each piece consists of a ring, which either slips over or inside of *d*, and this ring is joined to the main tube, N, Fig. 3, by two thin pieces of metal, *e*. The openings on the sides thus produced give an additional supply of air, determining a complete mixture within the tube, N, which burns at the exit orifice. A gas lamp under the tube, N, which is disposed laterally, serves to dry the current.

M. Cougnet, the inventor, claims that by this apparatus a very intense heat may be produced at a decreased expenditure of gas, owing to more perfect combustion.

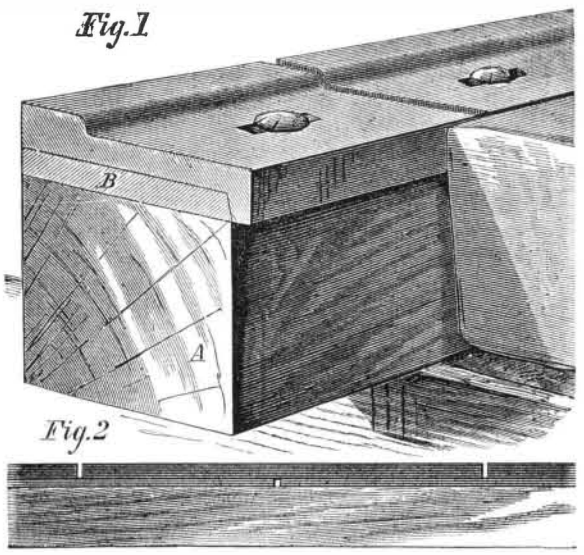
Mr. Thomas Webster, Q. C.

This eminent patent lawyer died suddenly on June 3, at his residence in London, England. On the previous day, he was engaged in the duties of his profession; and was in good health up till late on the day of his death, when he felt fatigued. In the evening, he rose to leave his room, and fell dead in the arms of his servant.

Mr. Webster had for many years held a high reputation for learning and forensic ability at the English bar; and his experience in patent matters, and his wise and strenuous advocacy of a peremptory protection, by all governments, of the rights of inventors, make his death a matter of regret with all who sympathize with progress and the arts and sciences. He visited Vienna in 1873, and was appointed a member of the International Patent Association which held its meetings there; and he expressed to Hon. J. M. Thacher, now United States Commissioner of Patents, who was also a member of the Commission, great admiration for the patent system of this country, and desired that the English practice should be, in its main features, assimilated to it.

NESSLE'S STREET RAILWAY RAIL.

In the invention herewith illustrated, the rails are supported by a continuous line of plates, thus, it is claimed, rendering the track firm and solid, and lessening the expense of repairing. The greatest advantage, however, is that, when the rails become worn out, they can be removed, leaving the plates in their places, when simply new top rails alone need be put down, thus, according to the inventor, decreasing the expense nearly one half



It is also claimed that the compound rail is stronger than a solid rail of the same thickness, and that, as it has no battering or bending points, the jarring so destructive both to rails and rolling stock is avoided.

A, in the engraving, is the timber ordinarily laid down to form the base for the track. On this is secured a series of flat plates, B, and on top of the plates are laid the rails, in such a manner as to break joints with the under plates. The fastening spikes extend through the rails and plates, securing both, suitable slots allowing of the contraction and expansion of the metal being made for their introduction.

Patented May 4, 1875. For further particulars address the inventor, Mr. John P. Nessle, 23 Frelinghuysen avenue. Newark, N. J,

ASTRONOMICAL NOTES.

OBSERVATORY OF VASSAR COLLEGE.

For the computations of the following notes (which are approximate only) and for most of the observations, I am indebted to students. M.M.

Positions of Planets for July, 1875.

Mercury.

Mercury cannot be seen in the early part of July, as it rises after the sun, on the 1st at 5h. 27m., and sets at 7h. 45m. P. M. On the 31st, it rises before the sun, at about half past 3, and sets a little after 6 in the evening. It can be best seen on the 27th, when it is at its greatest elongation.

Venus.

On the 1st of July Venus rises at 3h. 2m. A. M., and sets at 5h. 50m. P. M. On the 31st, it rises at 3h. 42m. A. M., and sets at 6h. 30m. P. M.

Mars.

Mars rises, on the 1st of July, at 6h. 50m. P. M., and is easily recognized by its ruddy light. Although very low in altitude, Mars will be very conspicuous all through the month, coming to the meridian at about 11 P. M. early in the month. On the 31st Mars rises at 4h. 37m. P. M., and comes to meridian at 8h. 45m. P. M., at an altitude, in this latitude, of 20½°.

Jupiter.

On the 1st, Jupiter rises at 1h. 12m. P. M., and sets a little after midnight. Jupiter rises on the 31st at 11h. 26m. A. M., and sets at 10h. 26m. P. M.

On the 5th of July the second satellite of Jupiter will disappear, by being behind the planet, for nearly three hours (in the evening), while the first is unseen in consequence of being in the shadow of Jupiter. The second satellite comes out from behind the planet, is seen for a few minutes, and then disappears by going into the shadow.

On the 7th, Jupiter, when first seen in the evening, will be without its largest satellite, that moon being behind the planet. On the 14th the same satellite disappears, after 10 P. M., by again going behind the planet.

Saturn.

Saturn rises soon after 10 P. M. on the 1st of July among the small stars of *Aquarius*.

Mars, Jupiter, and Saturn can all be seen in the evening hours throughout the month; when Mars is seen directly south, Jupiter will be seen in the southwest, and Saturn in the southeast.

On the 31st, Saturn rises at 8h. 3m. P. M., and sets a little after 6 the next morning

Uranus.

Uranus is not in position for observations. It rises in the morning and sets early in the evening all through the month.

Sun Spots.

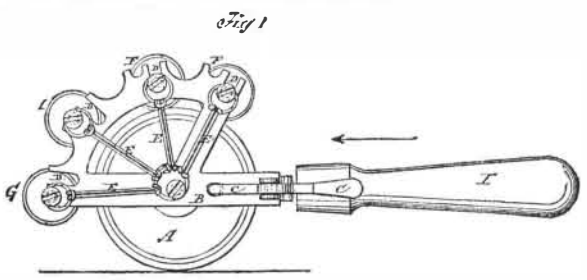
The report is from May 22 to June 17 inclusive. In the photograph of May 22 no spot is seen. Photography was interrupted by clouds from May 22 to May 27, and from that date till June 2 no spots were observed. In the picture of June 2, two small spots appeared coming on, and the pictures of June 4 and 5 show the regular motion of this group across the disk, on account of the sun's motion on its axis. On June 7 one of these spots was seen to be much smaller, and in the next picture, June 10, it had disappeared. The other did not appear to change, and was last seen, June 11, on the very edge. In the photographs of June 12, 14, and 15, no spots are observed. The picture of June 16 shows a group of spots on the eastern limb, which do not appear on the picture of the previous day, and the photograph of to-day, June 17, shows the motion to be regular. For a month past the spots have been very few and small.

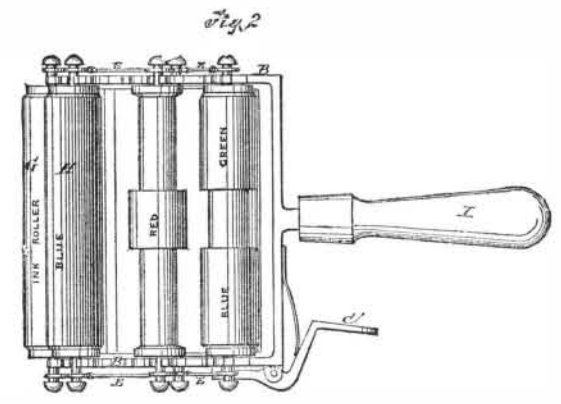
Another Steam Horse.

Mr. Fortin Hermann, says *Les Mondes*, is testing a machine which is moved by articulated feet which are successively planted upon the ground. Two feet act from the front body and two from the rear, being pressed downward by steam, which besides, in a horizontal engine, oscillates rods which, acting upon the feet, cause the apparatus to drag itself along. From experiments cited, it appears that the feet, when shod with rubber and charged with a weight of 2·2 lbs. per 0·4 inch, indicated an adhesion equal to 0·75 of the weight of the motive machine. The apparatus travels at the rate of from 4 to 4·8 miles per hour; and by a new arrangement, in which one pair of feet trot while the other pair amble, it is expected to run at the rate of 12 miles. It will ascend grades of 1 in 10 with quite heavy loads.

BALDWIN'S ROTARY HAND STAMP.

Mr. Charles E. Baldwin, of New York city, has patented a hand stamp by which the operator is enabled to print any number of colors at one time by a single movement across the paper. In Fig. 1, in the engraving, A represents a cylinder, on which the type is set. The said cylinder has its bearings in the arms of the frame, B, and is held from making more than one revolution by the spring catch, C, which strikes against a pin or lug on the cylinder end. The ink and color rollers rest in slots, D, on the arc, forming bearings for them to revolve in, and are held in such a position by elastic bands, E, attached to rings slipped over their ends, and to a ring set over each end of the type cylinder journals, as shown in Fig. 1. F F F F represent notches or rests, into which such rollers as are not required to be used are lifted, so as to clear them from the type cylinder.





The engraving represents the device ready for printing in blue, red, and green, and showing the other rollers lifted out of connection with the type. When it is desired to print in black or any single color, it will be necessary to use a single roller, as G or H, and raise all the others off the type cylinder into their respective rests, F. The rollers are wrapped with flannel or its equivalent, so as to absorb a sufficient amount of coloring material to feed the type uniformly.

How can the Grasshoppers be Utilized?

The Minnesota State authorities have hit upon a way of clearing the four counties to which the grasshoppers have confined their ravages, which certainly deserves credit. It is praiseworthy for several reasons, for it has set the people inventing, provided them with lucrative work at a time when the destruction of their crops threatened to cut off all income, and actually put the grasshopper at a premium. The plan is simply to buy the grasshoppers from the farmers at ten cents a quart. The people have fairly jumped at the offer, and it is said that, in every town in the four counties, wagon load after wagon load of the hoppers is arriving, until now the pest is almost exterminated. In one county 1,000 bushels were paid for, and this was one day's catch. One farmer made $55 for the labor of his family for twenty-four hours. Another has driven parties off his farm with a pitchfork since the bounty system has been adopted, claiming the grasshoppers as his, and that he alone had a right to catch them. Still another individual, of a pious turn of mind, who refused to aid in burning the hoppers, on the ground that they were a dispensation of Providence and should not be interfered with, as soon as the reward was offered set his entire family to work, and added his own labor all day Sunday, making a nice sum by his endeavors.

Several ingenious traps have appeared, propelled by horse

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 publicinspection, though there were, I believe, a few more shares left for those desiring to invest.

New York city. ARGUS.

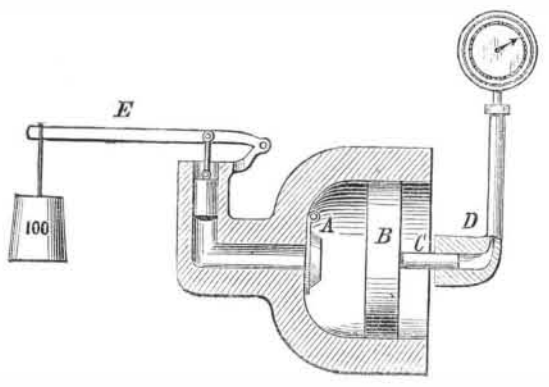
The Keely Motor.

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 he 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 theirnames, 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 $\frac{1}{24}$ 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