NOTES ON NEW DISCOVERIES AND NEW APPLICATIONS OF SCIENCE.

THE NEW METHOD OF OBTAINING OXYGEN.

We gave three weeks ago a brief account of Fleitmann's method of preparing oxygen, by gently heating a solution of chloride of lime with a small quantity of peroxide of cobalt. As cheap oxygen would be of immense value in the metallurgical and other arts, and as Fleitmann's process seems to promise to enable us to obtain that gas at a rate of cost at which it would be available for technical purposes, we now add a few further details. Chloride of lime is a compound of chlorine, calcium, and oxygen; Fleitmann's process abstracts all the oxygen, leaving behind only chloride of calcium. The peroxide of cobalt employed in the process is required only in very minute quantity,—one part of the peroxide to a thousand parts of chloride of lime will usually be found sufficient,—and as the same portion of peroxide can be used over and over again, while the reaction takes place at a temperature of between 70 and 80 deg., so that the process does not involve the consumption of much fuel, the cost of obtaining oxygen by this method should but very slightly exceed the cost of the chloride of lime, which is a tolerably cheap commodity. M. Fleitmann's theory of the process is that there are several peroxides of cobalt, containing different proportions of oxygen, and that "one of these peroxides abstracts oxygen from the chloride of lime to form a higher oxide, which is then decomposed into a lower oxide and free oxygen," this alternate composition and decomposition going on continuously. Instead of adding actual peroxide of cobalt to the chloride of lime solution, it is sufficient to add a proper quantity of solution of any cobalt salt from whose solution the hydrated peroxide is precipitable by chloride of lime. The solution of chloride of lime should be a strong one, and, as we have already stated, "should be quite clear, as a thick or murky solution will froth over." M. Fleitmann's explains that "the best way of making a clear and strong solution is by first digesting one portion of chloride of lime in water, decanting the clear liquor, and then making use of it to digest another portion of chloride. In this way it is easy to get a liquor which will evolve from twenty-five to thirty times its own volume of oxygen." He adds: "On the small scale it is best to employ a capacious flask, which may be about seven-eighths filled with the solution. On a large scale, for technical purposes, a sort of steamboiler might be used, and the oxygen be so obtained under pressure, and capable of being employed as a blast." M. Fleitmann has published no statement of the cost of oxygen obtained by this method, but it would probably not exceed one half penny per cubic foot,—a price at which it would not be too costly for use in many operations in the arts requiring an intense temperature.

SILICIUM IN IRON.

It is well known that there are two states in which carbon exists in solid iron: a state of chemical combination with the iron, and a state of merely mechanical diffusion through its mass. It is also known that the carbon existing in iron in the last-mentioned state is always in the form of graphite. Dr. Phipson has just announced to the Academy of Sciences that he has discovered that silicium also may exist in cast iron either in a state of combination or in a state of diffusion merely, and that, like carbon, when merely diffused through the iron, and not in combination therewith, it is always in the graphitic form. He adds, what, if true, is of great practical importance, that upon the condition of the silicium in any given sample of cast iron depends, in a very great degree, the practicability of converting that iron into steel by the Bessemer process. He regards diffused or uncombined silicium as the least injurious, stating that while iron containing as much as three or four per cent of free silicium can be converted into excellent steel by the Bessemer method, the presence of a very much smaller quantity of combined silicium will either render the iron containing it incapable of being converted into steel by that method at all, or will cause the steel produced from such iron to be so hard and bad as to be quite incapable of being worked. He promises to publish shortly a full account of his method of determining the condition in which silicium exists in iron, with details of his experiments upon the influence of that condition upon the results of the treatment of the iron by the process referred to.

SIMPLE METHOD OF REDUCING SOME METALS.

Glucinum and zirconium, the former being the metallic base of the emerald and the latter that of the zircon and the hyacinth, are metals of which chemists know very little. They have hitherto been obtained only from very rare and costly minerals, and by reduction from their haloid salts by means of potassium. A paper in the last number of "Cosmos" suggests, however, that these two metals, and also the still less known ones, yttrium, erbium, terbium, cerium, thorinum, lanthanum, and didymium, probably exist much more abundantly than has hitherto been supposed and states that they all admit of being isolated by an exceedingly simple electrolytic method, consisting merely, in each case, in immersing in a solution of a salt of the metal which it is desired to reduce a plate of zinc and a plate of platinum, duly connected together. The metal is then gradually precipitated upon the platinum plate.

PRODUCTION OF PURE IRON FOR ELECTRO MAGNETS.

It is very important that the iron used in the construction of electro-magnets and their armatures should be as pure as possible, since the purer iron is the more strongly susceptible is it to magnetic attraction, and the more speedily it loses any magnetic power which it may have acquired by induction. Electrolysis, however, is the only method as yet known by which iron can be obtained in a state at all approching purity, and electro-deposited iron has not hitherto been obtainable cheaply enough to admit of its being used in the construction of electro-magnetic apparatus of any size. M. Becquerel has been trying to find a cheap method of obtaining such iron, and he has devised one by which he thinks that electrolytic iron could be obtained at a price at which it would not be too costly for use in the construction of telegraphic and other electro-magnetic apparatus. Into one of the branches of a large U-shaped tube he pours a solution of proto-sulphate of iron, and into the other branch a solution of chloride of sodium. He then plunges into each branch a plate of platinum, one connected with the positive and the other with the negative pole of a constant battery of three or more cells. He so regulates the intensity of the current as to keep the disengagement of hydrogen barely perceptible, and the final result of the primary and secondary actions which take place is that a double sulphate of iron and sodium is formed at the positive pole, and that oxide of iron is reduced by hydrogen at the negative pole. The reduced iron is of course deposited on the negative electrode, from which, however, in may be readily detached. It is all but absolutely pure, and is attracted by the magnet much more powerfully than the purest iron hitherto obtainable in commerce.

ALUMINA AS AN INGREDIENT OF SOAPS.

Soaps intended for toilet use ought not to contain any free alkali, seeing that free alkali exercises a corrosive action upon the skin. Soaps, however, which are perfectly neutral, containing no alkali which is not combined with the steuric or other fatty acid employed, are not nearly such powerful detergents as soaps containing an excess of alkali,—are not nearly so capable of dissolving the substances which it is the office of soap, when applied to the body to remove from the skin. Singular to say, M. Bonnamy, a manufacturing chemist resident at Saint-Germain, has found that if that very neutral substance, pure alumina, be added to completely neutral soap, the soap becomes even more powerfully detersive than the most highly alkaline soap, while remaining entirely free from corrosive properties. The alumina may be introduced into the soap in various ways, the most advantageous perhaps being the use, in the process of manufacturing the soap, of an alkaline salt of alumina, as aluminate of potash or soda, instead of free alkali. An equally good result is however obtained by mixing free alumina, in dry powder, with melted soap which has been manufactured in the ordinary way. M. Bonnamy proposes to use alumina also in various cosmetics, and especially in cold-cream, and he moreover regards it as affording an admirable base for tooth-powders, by reason of its complete neutrality, and the case with which it can be tinted by means of perfectly innocent coloring matters.

ANILINE AS A TEST FOR THE ADULTERATION OF LINEN BY COTTON.

A method of using aniline as a means of ascertaining whether or not the linen in any fabric is mixed with cotton, and, if so, in what proportion, is given by Bottger in a recent number of the "Chemisches Central Blatt." At the corners of one end of a strip of the fabric to be tested he loosens the threads so as to expose both the warp and the woof. He then dips that end of the strip in an alcoholic solution of aniline red, washes it in water until the washings are colorless, and then places it in an aqueous solution of ammonia. If any cotton is present, the ammonia will discharge the color from it without touching the color of the linen portion. The linen threads will remain of a bright rose color, but the cotton threads will become quite white.

ON SCIENTIFIC EXPERIMENTS IN BALLOONS.

BY JAMES GLAISHER, ESQ., F.R.S., ETC.

The *London Artisan* publishes a long letter by Mr. Glaisher giving the results of his numerous observations in balloons on the temperature and moisture of the atmosphere, and other matters of interest; from which paper we take the following statements:—

DECREASE OF TEMPERATURE WITH ALTITUDE.

WHEN THE SKY WAS CLOUDY.

Feet	Feet.		Deg.		Feet.
From 0 to	1,000	the decrease was	4·5	or 1 deg. on the average of	223
From 0 to	2,000	"	8·1	"	247
From 0 to	3,000	"	11·8	"	355
From 0 to	4,000	"	15·2	"	263
From 0 to	5,000	"	18·5	"	271
From 0 to	6,000	"	21·7	"	277
From 0 to	7,000	"	34·4	"	287
From 0 to	8,000	"	26·8	"	299
From 0 to	9,000	"	29·0	"	311
From 0 to	10,000	"	31·0	"	321
From 0 to	11,000	"	33·0	"	329
From 0 to	12,000	"	35·6	"	337
From 0 to	13,000	"	37.8	"	344
From 0 to	14,000	"	40·1	"	349
From 0 to	15,000	"	42·1	"	356
From 0 to	16,000	"	44·2	"	362
From 0 to	17,000	"	45·4	"	375
From 0 to	18,000	"	46·7	"	386
From 0 to	19,000	"	48·1	"	395
From 0 to	20,000	"	49·0	"	409
From 0 to	21,000	"	50 1	"	4 9
From 0 to	22,000	"	50·9	"	432
From 0 to	23,000	"	51·7	"	445

WHEN THE SKY WAS CLEAR, OR CHIEFLY CLEAR.

Feet.	Feet.		Deg.		Feet.
From 0 to	1,000	the decrease was	6·2	or 1 deg. on the average of	162
From 0 to	2,000	"	10 9	"	184
From 0 to	3,000	"	14·7	"	204
From 0 to	4 000	"	18·0	"	223
From 0 to	5 000	"	20 9	"	239
From 0 to	6,000	"	23·5	"	259
From 0 to	7,000	"	26·0	"	271
From 0 to	8,000	"	28·7	"	279
From 0 to	9,000	"	31·2	"	289
From 0 to	10,000	"	33·6	"	298
From 0 to	11,000	"	35·6	"	309
From 0 to	12,000	"	37·9	"	317
From 0 to	13,000	"	40·1	"	324
From 0 to	14,000	"	42·1	"	333
From 0 to	15,000	"	43·8	"	343
From 0 to	16,000	"	46·0	"	348
From 0 to	17,000	"	47·9	"	355
From 0 to	18,000	"	49·6	"	363
From 0 to	19,000	"	51·1	"	372
From 0 to	20,000	"	52·4	"	382
From 0 to	21,000	"	53·6	"	392
From 0 to	22,000	"	54·7	"	405
From 0 to	23,000	"	55·7	"	413
From 0 to	24,000	"	57·0	"	422
From 0 to	25,000	"	58·1	"	431
From 0 to	26,000	"	59·1	"	441
From 0 to	27,000	"	60·1	"	449
From 0 to	28,000	"	61·0	"	459
From 0 to	29 000	"	61 8	"	469
From 0 to	30,000	"	62.3	"	482

These results, showing the whole decrease of temperature from the ground to 30,000 feet, differ greatly, as just mentioned, from those with a cloudy sky.

The numbers in the last column, showing the average increase of hight for a decline of 1° of temperature from the ground, to that elevation, are all smaller than those with a cloudy sky at the same elevation. Each result is based upon at least seven experiments, taken at different times of the year, and up to this hight considerable confidence may be placed in the results; they show that a change takes place in the first 1,000 feet of 1° on an average in 162 feet, increasing to about 300 at 10,000 feet. In the year 1862 this space of 300 feet was at 14,000 feet high, and in 1863 at 12,000 feet. Therefore, the change of temperature has been less in 1863 than those in 1862, and less in 1864 than in 1863, but the experiments have all been taken at different times of the year.

Without exception, the fall of 1° has always taken place in the smallest space when near the earth.

MOISTURE OF THE ATMOSPHERE.

After giving long tables of his observations, Mr. Glaisher thus sums up the results:—

The law of moisture shown in a cloudy day is a slight increase from the earth to the hight of 3,000 feet, and then a slight decrease to 6,000 feet, the degree of humidity being at this elevation nearly of the same value as on the ground; from 6,000 feet to 7,000 eet there is a large decrease, and then an almost uniform decrease to 11,000 feet; it increases from 12,000 feet to 16,000 feet, and then decreases. The number of experiments up to 11,000 feet vary from 10 to 33, and I think good confidence may be placed in the result to this elevation, but at hights of 12,000 feet the number of experiments are evidently too small to speak with any confidence in respect to the results.

The law of moisture shown in a clear sky is a slight increase to 1,000 feet, a considerable increase between 1,000 feet and 2,000 feet, a nearly constant degree of humidity from 2,000 feet to 5,000 feet, and a gradual decrease afterward to 12,000 feet. At greater hights the numbers are less regular. The results up to 11,000 feet are based upon experiments varying from 10 to 23, and are most likely very nearly true normal values; at hights exceeding 12,000 feet the number of experiments have varied from 1 to 8, and no general confidence can be placed in them.

By comparing the results from the two states of the sky, the degree of humidity of the air up to 1,000 feet high, is 15 less with a clear sky than with a cloudy; from 2,000 to 5,000 is from 4 to 6 less; at 6,000 feet the air with a clear sky is much drier than at 5,000 feet, but with a cloudy sky it is nearly ot the same degree of humidity, so that the difference between the two states is large, amounting to no less than 11; the difference decreases to 0 at 9,000 feet, but increases to 4 at 11,000 feet; at hights exceeding 11,000 feet the air with clear skies generally becomes very dry, but wih cloudy skies frequently becomes more humid, as was to be expected from the fact of the presence of clouds at hights exceeding three and four miles.

In both states of the sky at extreme elevations the air becomes very dry, but, so far as my experiments go, is never free from water.

CAUSE OF THE MILD WINTERS IN ENGLAND.

The meeting ot a strong current of air from the south-west of so great a depth as nearly one mile, over our country on January 12th, in the season of winter, which current I know continued many days, must have exercised great influence. This was the first instance of meeting with a stream of air of higher temperature than on the earth; above this the air was dry, and higher still it was very dry; fine granular snow was falling thickly above this warm stream of air.

The south-west current being thus observed is of the highest importance, as bearing upon the very high mean temperature we experience during winter, so much higher than is due to our position on the earth's surface, and it is highly probable that to its fluctuations the variations of our winters are due.

Our high winter temperature has hitherto been referred for the most part to the influence of the heated water of the Gulf Stream; but if this were the case the same agency being at work around the coast of France should exercise the same influence, yet we know that the winters of France are more severe than our own, though situated so much south of us.

Dr. Stark, of Edinburgh, some years since, referred the mildness of the winters in Britain for the most part to prevalence of the south-west or anti-trade wind, which is the prevailing aerial current in this latitude during winter.

He observes, so long as these winds blow, we have no frosts or intense colds; but the moment the wind changes during winter to an easterly, north-easterly, or northerly direction, we have both frost and snow, and more or less intense cold.

The south-west winds in their course meet with no obstruction in coming to us, but they blow directly to us and to Norway over the Atlantic; and hence we enjoy a much milder climate during winter than any other lands not similarly situated with regard to such winds.

The south-west winds cannot reach France till they have crossed the whole of Spain and the high mountain range of the Pyrenees; and by the time they have crossed that mountainous country they are so much cooled that France can derive comparatively little benefit from them, and hence apparently her more severe winters.

Another fact may be inferred from this winter trip: it has always been a matter of great difficulty for me to account for the simultaneous appearance of dense fog over the whole country and extending far out to sea, but the fact of a warm current of air, situated under a mass of snow falling, would fully account for the production of any amount of fog.

Another inference may be drawn from the facts noticed; one only I will mention, and it is this: If during the prevalence of a warm current of air passing over these islands, there can be currents of air of so low a temperature as I experienced, it is evident that, as it is but a struggle between two or more forces, either of which may preponderate at any moment; it is not safe, therefore, in the winter months, how mild soever the weather may be, to go thinly clothed at any time, for any moment this warm current may be deflected, and its place occupied by the cold current, and thus some of our sudden and apparently unaccountable changes may be due.

CURRENTS OF WIND IN DIFFERENT DIRECTIONS AT VARIOUS ELEVATIONS.

1862.—JULY 30.

[The direction of the wind before starting was N. W.]

At 4 h. 41 m. 16 sec., at 480 feet, the direction of the wind was S. W.
At 5 h. 17 m 30 sec., at 5,1 5 feet, " N. N. W.
At 5 h. 40 m. 30 sec., at 6,183 feet, " N.

1862.—SEPTEMBER 1.

[The direction of the wind before starting was E. N. E. verging to E]

At 5 h. 4 m. 0 sec., at 3,268 feet, the direction of the wind E. N. E.
At 5 h. 10 m. 0 sec., at 3,318 feet, " E.
At 5 h. 11 m. 30 sec., at 3,560 feet, " E. S. E.
At 5 h. 17 m. 0 sec., at 3,580 feet, " E. N. E.
At 5 h. 36 m. 0 sec., at 4,190 feet, " W.

1863.—MARCH 31.

At 4 h. 58 m. 0 sec., at 18,302 feet, the direction of the wind N. E.
At 4 h. 58 m. 30 sec., at 17,097 feet, " S. W.
At 5 h. 12 m. 0 sec., at 20,865 feet, " nearly W.
At 6 h. 15 m. 0 sec., at 4,441 feet, " S. E.
At 6 h. 16 m. 0 sec., at 5,168 feet, moving back again.

1863.—JULY 11.

[Before starting the wind was E.]

At 4 h. 59 m. 30 sec., at 2,633 feet, the direction of the wind was N.
At 7 h. 14 m. 0 sec., at 1,876 feet, " E.
At 7 h. 56 m. 45 sec., at 1,029 feet, " S. E.
At 7 h .57 m. 0 sec., at 1,000 feet, " W.

1864.—JANUARY 12.

At 2 h. 9 m 0 sec, at 655 feet, the direction of the wind was N. E.
At 2 h. 14 m 0 sec., at 1,328 feet, " E
At 2 h. 11 m. 0 sec., at 1,51 feet, " S. W.
At 2 h. 32 m. 0 sec, at 5 401 feet, " S.
At 3 h. 3 m. 0 sec., at 8,086 feet, " S. S. W.
At 3 h. 20 m. 0 sec. at 10,017 feet, " S. S. E.

Interesting Details of Animals Traps.

The English Society for the Prevention of Cruelty to Animals recently offered a prize of $200 for a more humane vermin trap, to which invitation no less than 126 competitors have responded by sending in for exhibition and judgment to the Royal Horticultural Gardens, South Kensington, every possible variety of ingenious device for outwitting mice, rats, stoats, weasels, polecats, grimalkins of the domestic species having their predatory instinct unduly developed, foxes, owls, hawks, and all other creeping and flying things, which dare to gratify tastes that they have in common with that stupendous monopolist—man. Some of the traps are most elaborate pieces of workmanship; others are altogether as primitive in their construction, descending in simplicity to one consisting of a few pieces of cardboard sitched together with a needle and thread. To judge from the different character of the contrivances, the society were not very exact in their definition of a "humane" vermin trap. Some of the exhibitors take the view which probably, all things considered, is the correct one, that humanity in dealing with a "varmint" is to kill it outright with as little suffering as possible. Others seem to think that humanity consists in "catching 'em alive, oh," leaving the final disposition as a matter for future consideration. Amongst the pleasant conceits of the former class of theorists were several modifications of the principle of the guillotine. Some of these had a fixed lower blade, by the side of which a moveable upper blade descended with the deadly force imparted by a strong spiral spring. Many varieties of dead-fall traps were exhibited, some depending merely on the weight of the falling block to smash the wretched vermin that found their way in; others in which the inventors showed their "humane" proclivities by thickly studding the lower side of the block with sharp steel spikes, the effect being to make the victim for the time a pin cushion. It only required to have these spikes arranged in the "welcome little stranger" [refers to the way in which pins are stuck on cushions in the form of letters.—EDS.] form to make the grim humour of the thing complete. It would be tedious to attempt to recapitulate the variety of gin traps, dead-fall traps, pit-fall traps, live-bait traps, through run traps, and self-setting traps included in the number exhibited. No. 4, the invention of Mr. Smith, is a most ingenious modification of the pitfall trap, applicable to animals of all sizes from a mouse to a lion. It consists of a balance weighted half-sunk cage, into which the animal jumps to reach the bait from a solid platform. His weight causes the cage to descend, and on his passing out by a hole in the side into a pen from which he cannot return, the cage rises for the next comer. The simplest, the cheapest, the most generally applicable, and the most readily made, is an improvement on the old figure of four trap, invented by James Miles, gardener to C. Woodd, Esq., of Rosslyn House, Hampstead. It consists of a box or hurdle, supported by two sticks, which are held together by a slit cut in the side of a twig carrying the bait. Any one could prepare such a trap with a pocket knife in a few minutes. It can be made to catch a mouse or a mastiff dog, to act as a live trap or as a dead fall; it might remain set for months in a corner without its efficacy becoming impaired from exposure, and is as efficient as it is simple.—*Trade Circular.*

Benzol in Canadian Petroleum.

In a note to a long and interesting paper on certain hydro-carbons obtained from petroleum, read before the Royal Society, on April 6th, by Mr. C. Schorlemmer, of Owen's College, Manchester, it is stated by that gentleman that he has found "a not inconsiderable quantity of hydro-carbons of the benzol series in Canadian petroleum." He first found traces of these compounds in some petroleum oils upon which he was experimenting, and which he supposed to be American. Pelouze and Cahours, however, state positively that the American petroleum used by them did not contain hydro-carbons of the benzol family. Knowing, therefore, the marvelous accuracy with which all experiments have been carried out by these famous chemists, Mr. Schorlemmer thought it not impossible that there had been some accidental or intentional mixture. He accordingly endeavored to procure an authentic specimen of crude Pennsylvania petroleum, but unsuccessfully, as none had come into the Liverpool market for several months. He, however, succeeded in getting some real Canadian rock-oil, in the shape of thick, black liquid, having a very unpleasant odor. He distilled it, and treated the portion, boiling below 302° F. (150° C.) with concentrated nitric acid, which acted upon it with great violence. The acid liquid was then diluted with water, and heavy nitro-compounds separated, possessing the characteristic odor of bitter almonds, belonging to nitro-benzol and its congeners. These were treated with tin and hydrochloric acid, and the solution obtained distilled with caustic potash. The aqueous distillate, in which drops of an oily fluid, possessing several of the properties of aniline, were found, gave, with a solution of hydrochlorite of lime, the most distinct violet color, showing, without question, that aniline was present. The test was further affirmed by the addition of a few grains of bichloride of mercury, which formed rosaniline crimson. There can be no doubt, therefore, that Canadian petroleum contains the series of benzol compounds, which, as our readers know, form the starting-point of the aniline dyes. The importance of this discovery depends, in a great measure, upon the amount of benzol compounds to be obtained from Canadian petroleum; and we could have wished that Mr. Schorlemmer had given us a more definite idea of the amount of these bodies contained in the crude oil than "a not inconsiderable quantity." When will chemists give up the use of such terms as "a little," "a small amount," etc.? Whether the American oil will yield these bodies remains to be proved, and we should advise those of our readers who possess authentic specimens of American oil—and there must be many such—to try the very simple series of experiments necessary to prove the presence or absence of these important hydro-carbons.—*Chemist and Druggist.*

FATE OF ASSASSINS.—Harold, Payne, Atzerodt and Mrs. Suratt, having been found guilty of the crime of assassinating President Lincoln, were executed on Friday, the 7th inst., in the city of Washington. Dr. Mudd, Arnold and O'Laughlin have been sentenced to imprisonment and hard labor for life, and Spangler to six years' imprisonment and hard labor in the Albany penitentiary.

MANUFACTURE OF IRON.—Mr. F. Seebohm of Dusseldorf, proposes to manufacture iron with 25 per cent refuse iron pyrites, 25 per cent manganese ores, 35 per cent ironstone, and 15 per cent lime. The mixture is melted in a blast-furnace, with hot or cold blast, in the ordinary manner.

Improved Funnel and Measure Combined.

There are, unhappily, innumerable careless persons in this world who never put anything in the same place twice, and who drop whatever utensil they may have in hand just where they were using it. To such individuals the measure and funnel combined, here illustrated, will prove convenient, for it is impossible to misplace it or detach it from the vessel it is used with. This article combines the advantages of a vessel or measure with a funnel for decanting liquids, so that no waste occurs in emptying the measure into the funnel, and none from the funnel, as the fluids pass into the bottle or demijohn.

The engraving shows the several uses it may be applied to The measures are graduated on the sides and furnished with a guard at the top from which a spout protrudes. This spout is to be inserted in the demijohn, as shown, and the measure elevated, in which position it can be left until empty; it is not necessary to hold it as the measure sustains itself. It is claimed that fluids of all kinds can be more economically measured in this vessel than in others, and that there is a saving in labor and the cost of utensils from the combiinng two articles, which are usually separate, in one.

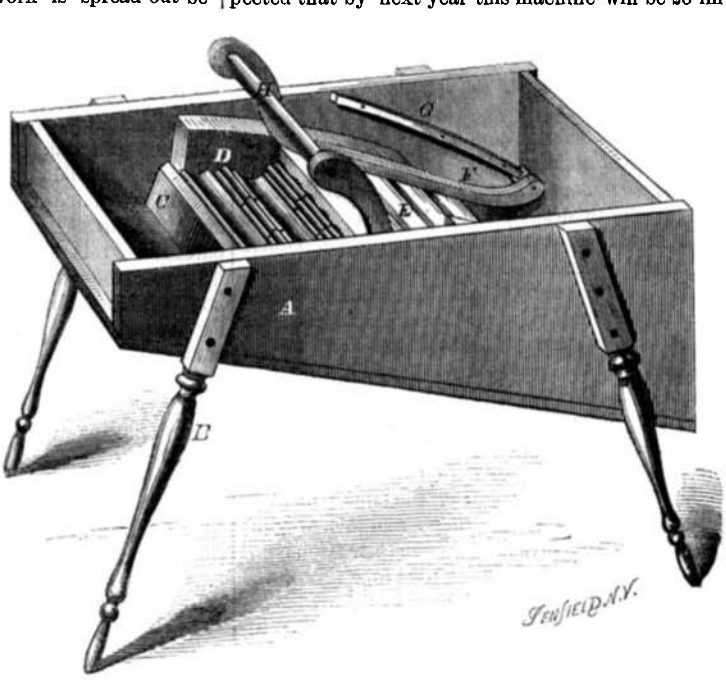
DUMMER'S FUNNEL AND MEASURE COMBINED.

This funnel was patented through the Scientific American Patent Agency on April 5, 1864, by S. R. Dummer. For further information as to sale of rights, etc., address the agent, Mr. Harry McBride, 174 Washington street, New York.

Improved Washing Machine.

A good washing machine is one of the most desirable things in a family, for there is no more fatiguing employment in housekeeping than cleaning the linen. This machine is designed to imitate the motions and action of the hand, on the garments to be cleaned, and is so arranged that the work is spread out before the operator in full view, thus rendering it possible to direct the attention to the part which may require it the most, instead of wasting labor on the whole, miscellaneously.

The machine, in detail, consists of a water-tight case, A, having legs, B, and an inclined rubbing board, C. This board has grooves in it which carry rollers, D, also grooved. Over the top of these rollers there is another rubbing board, E, which consists of a series of slats grooved diagonally across their length; one end of the board is provided with arms, F, which slide on guides, G, so as to make it uniform in action. The top rubbing board is capable of being raised up vertically to accommodate the clothing to be washed, and at the same time it can be slid back and forth over the surface of them. Clothes to be washed are placed between the rubbing boards, and the case is partly filled with hot suds. The operator then takes hold of the handle, H, and pulls and pushes it alternately to and fro, thus subjecting the linen to a thorough cleansing process analogous to that given in washing by hand and performing the labor in a short time.



BUCKWALTER'S WASHING MACHINE.

This machine was patented through the Scientific American Patent Agency on May 9, 1865, by Henry L. Buckwalter. For further information address H. L. Buckwalter & Co., at Kimberton, Pa.

Agricultural Machinery.

The farmers of our Eastern States, compelled to till rocky and uneven lands, and used to small holdings, do not know, by experience, all of the changes which improved machinery has wrought in agricultural operations on the great Western prairies. There machines do the labor of men to such a degree that the farmer's heaviest toils are lightened, and one man is enabled to achieve, with ease, the work of half a dozen.

We saw, recently, a corn field of one hundred and sixty acres, on the Grand Prairie, in the plowing, planting and cultivation of which no man walked a step. A rotary spader, drawn by four horses, and driven by a man upon the box, plowed the field to a uniform depth of eight inches, and gave such thorough tilth that it was not necessary to use a harrow at all. A corn-planter, drawn by two horses, and driven by a man upon the box, next planted the seed. A cultivator drawn by two mules, one walking on each side of the knee-high corn, and driven by a man upon the box, completed the culture of a row at a single operation; and in the tool-house lay another machine, also to be drawn by horses, which will cut down the corn when it is ripe and lay it in regular rows, to be finally gathered by hand. But it is expected that by next year this machine will be so im proved as to gather up the corn also.

When it is remembered that the farmer who follows a common plow or cultivator during a long summer's day, performs a march of from ten to fourteen miles, it will be seen what a boon is the machinery which relieves him from this toil. And when we remember how scarce were men during the last four year in the West, we shall see that but for such labor-saving implements our vast crops of cereals could neither have been planted nor gathered.

The farm of which the cornfield we speak of was a part, has seven hundred acres in a single field of timothy. Of what use would this be if it had to be cut by hand? But half a dozen harvesting machines sufficed to cut it all, in good time, and will do, without groaning, the work of half a regiment of men; patent horse-rakes gather it up; and two hay presses upon the place compress it into bales fit for shipping. Seventeen and a half miles of board fence inclose a little more than half of this farm, which has, as part of its furniture, comfortable sheds for ten thousand sheep, a corn crib, rat-proof, holding fifteen thousand bushels of corn, and extensive stabling for horses.

What machinery has thus done for the West it will do for the South, now that free labor is substituted for that of slaves. There is no reason why the cotton and sugar fields of a great part of the South should not be tilled by machinery. These fields are, in Louisiana, Mississippi, and indeed in almost the whole of the cotton and sugar region, level and devoid of rocks, and these are the only conditions necessary to the successful use of the most valuable farm machinery. The slaves, ignorant and careless because they had no interest in the work, used only the rudest and clumsiest tools; but in the hands of intelligent freemen, the rotary spader, or the steam plow, or cultivator, can be used as well on the immense level bottom lands of Louisiana, where sugar is grown, as on the prairies for corn and wheat.

Yankee ingenuity, too, will presently set itself to work to devise new implements for the more economical and rapid prosecution of such labor as cotton-picking and cane-cutting. The next ten years will witness an immense revolution in the methods of cultivating the great staples of the South; and the fruits of that change will be a greatly increased production of cotton and sugar by the help of free labor, and—what the use of machinery always brings with it—such increased rewards for intelligent labor as will prove, even to the most ignorant of the Southern population, the importance of schools and the pecuniary value of education.—*New York Evening Post.*

Effects of Heat in the Preservation of Wine.

Burgundy is much improved by a voyage to and from Calcutta. This fact led the author to try the effects of warmth on wines at home, and both he and M. Pasteur have come to the conclusion that wines may be much improved by gently warming them, and that sick wines may be cured by the same means. M. Pasteur has, in fact, taken out a patent for warming wines by placing the bottles in a hot-air stove, with the corks tied down, to prevent their being forced out by the expansion. The bottles must be quite full, and have no air in them, and are heated to 64° C. for half an hour, after which the cork is untied, driven home, and sealed down. In the process just described, of course all parasitic ferments are destroyed, and the wine keeps well after it.—*M. de Vergnette-Lamotte.*

To Keep Eggs.

Eggs, says a farmer's wife, can be kept for two years by dipping them in a solution made of one pound of quick lime and one of salt to one gallon of water. Take an old pail and put in your lime and water, and then stir until it is all dissolved, then add salt as above (keep it in the cellar); when cool enough, it is ready to use. Dip in the eggs, and see that they are all covered with the solution, which must be stirred from the bottom occasionally. Pack them, small end downward, in bran or salt, or without anything. When wanted for use or market, a little warm water will wash them clean. Some dip eggs in boiling water, some grease them and pack them in bran. I packed fifteen dozen (as I could gather them) in August in salt, and kept them until spring just as good as fresh. They must all be kept in a cool cellar a little moist rather than dry.

Erosion of Lead.

The erosion of lead, and even of type metal, by certain species of insects, is not generally known, and may be extremely mischievous. Not long ago it attracted the attention of the French Academy of Sciences, and several communications respecting it have been published with their proceedings in the *Comptes Rendus*. Of these the following is a *resumé* :—

In 1858 Marshal Vaillant exhibited to the Academy leaden bullets brought back from the Crimea, in some of which the larvæ of insects had excavated circular passages three or four millimetres in diameter, and in others superficial grooves. Inquiry was made through the Russian Ambassador, M. de Kisselef, whether similar erosion had been observed in Russia. M. V. de Motschulsky replied that nothing of the kind had been detected in the cartridges of the Russian army in the Crimea, and that the insect which had caused the injury appeared to be very rare in Russia, not having been discovered by Russian entomologists in the Crimea. It is stated to be very common in England, Sweden and Germany, and to occur in the Jura in France. It attacks silver firs and pines.

The insect which damaged the French cartridges was imported from France in the wood of the cases in which they were packed. All the excavated passages were originally circular in section, and those that were semicircular in section, that is, superficially grooved, were only segments, of which the other half was in the contiguous surface of other bullets or of the wood forming the sides of the cases. The passages were always open at both ends. Excavation was effected by the mandibles of the insect, the apparatus consisting of a saw toothed, and cut like a file. The insects do not eat the lead, but simply bore it out; and it was observed that their remains, after metamorphosis, had been carried downwards by the particles of the metal, reduced to powders, and dispersed on the outside through the cracks in the bottom of the packing case. The perfect insects did not attack the lead, but died in the passages, even immediately after their complete metamorphosis, as very often occurs with insects in general.

In 1833 Audouin exhibited to the Entomological Society of Paris, sheet lead from the roof of a building deeply grooved by insects. In 1844 Desmarest mentioned erosions and perforations of sheet lead by a species of Bostriche, and illustrated the fact by cartridges from the arsenal at Turin. Mr. Westwood, the well-known British entomologist, has recorded observations by himself on the perforation of lead by insects. M. Bouteille, curator of the Museum of Natural History at Grenoble, sent to the French Academy of Sciences, from the collection under his charge, specimens of cartridges gnawed by insects, which were found *in situ*, and the following report upon the subject was made by Marshal Vaillant, de Quatrefages, and Milne Edwards; the insect was *Sirex gigas*, a large hymenopterous species which, in the larva state, lives in the interior of old trees or pieces of wood, and which, after the completion of its metamorphosis, quits its retreat for the purpose of reproduction. As previously stated, it cuts its way by its mandibles, gnawing the woody substance or other hard bodies which it meets with in its course. Analogous perforations are made by the mandibles of the *Callidium saguineum*. The reporters add;—" If it is probable that it is always with their mandibles that coleopterous as well as hymenopterous insects thus attack lead or other hard bodies, it is not well established that it is always the desire of liberty which prompts them so to act. Indeed, in some cases, coleopterous insects have been seen to gnaw the exterior of similar bodies."

Reference was made to a paper by Antonio Berti on the perforation of leaden pipes by an insect named *Apate humeralis*.

Scheurer-Kestner, in 1861, communicated to the French Academy a notice of the erosion by an insect of the sheet lead of a new sulphuric acid chamber. The creature was caught in the act of escaping through the lead, having been imprisoned between it and a wooden support.

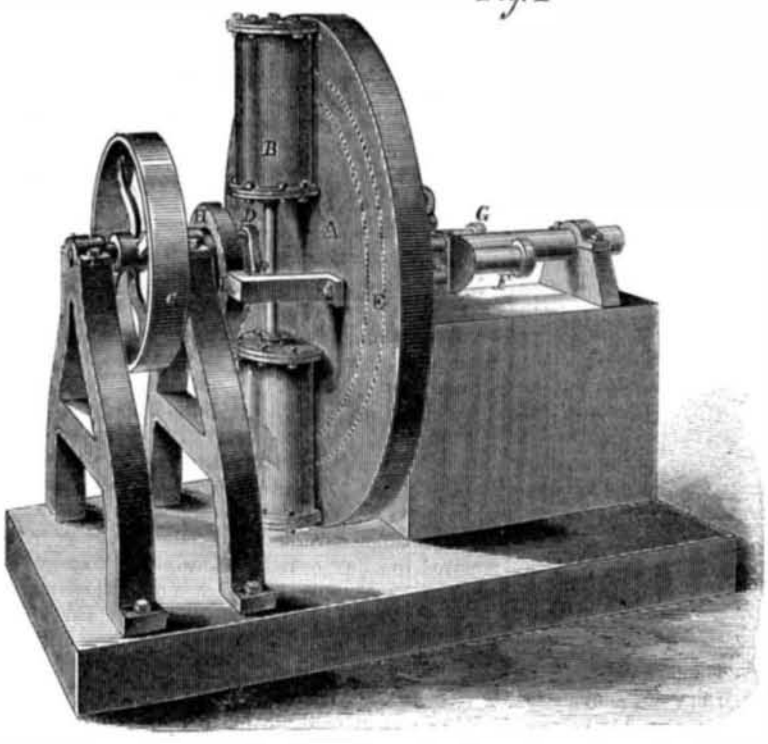
Perhaps the most interesting and important case of insect erosion is that of stereotype metal, which was communicated in 1843, by M. du Boys to the Agricultural Society of Limoges. Specimens riddled with holes were shown in illustration.—*American Annual Cyclopedia.*

Double-cylinder Revolving Engine.

Rotary engines, in one form or another, have occupied the attention of inventors for many years, and changes in the form or details of them, with a view to render them economical and efficient, are continually being made.

The engine here illustrated is not a rotary engine, inasmuch as the pistons in such machines travel continuously in one direction, but this combines a recip-

Fig. 1



FOSTER'S DOUBLE-CYLINDER REVOLVING ENGINE.

rocating motion of the piston with a rotary one of the cylinder, and adds the weight and momentum of that detail to the force exerted by the piston.

The following description will render the principle and main parts familiar to the reader:—

The wheel, A, on which the cylinders, B, are placed, is set below the center of the shaft and pulley, C, half the length of the stroke. When, therefore, steam is admitted to the pistons, they, on being forced out, act against the crank, D, and turn the cylinders and wheel around.

The steam is let into the cylinders by the ports, E,

Fig. 2

shown in dotted lines through the steam pipe, F, and the exhaust pipe is at G. There are two branches to both of these pipes, and when steam is let into one, by turning a valve the engine revolves in one direction, and is reversed by admitting steam to the other branch. It is intended to have two sets of cylinders, or four in all, the piston rods crossing each other at right angles, and one pair of cylinders set further from the shaft in order to allow the rods to work on different cranks on the same shaft. The yoke, H, is fitted to a bearing, I, thus distributing the labor on the main shaft. By having four cylinders there is no dead center, and the force is continuous at all times.

Fig. 2 shows the packing rings, which keep the wheel steam tight at the point where the steam is introduced. These rings fit in a circular chamber behind the wheel, A, and are made in sections so that the entire chamber will be prevented from losing steam by the expansion of them in every direction. The cylinders are lubricated by a cup on the steam pipe. This engine, says the inventor, is particularly useful for propellers, on account of the ease with which it may be reversed and the velocity of piston it is capable of attaining. It is also claimed to be simple and efficient, and that two revolutions of the pulley are obtained from one reciprocating movement of the pistons.

A patent is pending on this engine through the Scientific American Patent Agency by Joseph L. Foster, of Virginia, Nevada Territory. For further information address him as above, Box 153. [See advertisement on another page.]

Cutting Hard Steel.

The Secretary of the Franklin Institute, Henry Morton, Esq., in a recent report says:—

We give, for the benefit of those interested in the experiment, the particulars of the apparatus lately constructed for the Franklin Institute, to repeat Perkins' experiment of cutting hardened steel with a soft iron disk rotating at a high velocity. A disk of steel, such as is used for circular saws, but annealed so as to be very soft, is mounted on a steel spindle, which carries also a three-inch cast iron pulley, and the whole is then carefully balanced until it will rest indifferently in any position, on two straight edges.

This spindle, etc., is then mounted in cast iron swiveled bearings. A belt, 2 inches, wide, on the pulley is driven from a 36-inch pulley on an ordinary shaft, which carries also a 10-inch pulley, to which motion is given by a 4-inch belt from a 48-inch pulley on the engine shaft. The engine was run 120 revolutions per minute, which would give, with every allowance for "slip," between 5000 and 6000 revolutions per minute to the disk. At this velocity the hardest files were cut like soft wood, with the production of a blaze of light and showers of sparks, without the least injury to the edge of the soft disk.

The constructors of this apparatus were kindly furnished by Mr. Joseph Saxon, of Washington, with a general description of the machine originally made by him for Jacob Perkins in London, and in the above mentioned apparatus this description was followed, except where the improvements of modern machinery, warranted a deviation. The most important of these deviations was in the use of cast iron swivel bearings. In these the mobility of parts necessitates an equal distribution of the pressure and friction, over the whole surface of contact, and thus renders possible the use of a material otherwise so unfit as cast iron. The friction is in fact by this means brought between the steel and oils, and in no respect between the solid surfaces, at any point.

AMERICAN ANNUAL CYCLOPEDIA.

The fourth volume of this great work, containing the register of the important events of 1864 is now before us. It gives a very full account of the operations of the army and navy, illustrated by maps and cuts, with the proceedings of Congress, public documents, obituaries of eminent persons, and other matters constituting a complete history of the year. It is a volume of 838 pages, full of reading, interesting at the present time, and of inestimable value for future reference. It is published by D. Appleton & Co., 443 and 445 Broadway, New York.