Rabies Inoculation.

It is now about four years since Pasteur commenced his experiments and researches into the nature of hydrophobia, the results of which have been recently given to the public. Although the profession and scientists generally may not be very sanguine as to the grand results which this distinguished *savant* claims, yet enough has been advanced to warrant the French Government in appointing a commission of scientific men of indisputable authority to investigate the matter and to test the value of the interesting experiments instituted by Pasteur. The names of Vulpian, Villemin, Bert, and Bouley are a sufficient guarantee of the character and reliability of the proposed inquiry. Pasteur in the course of his experiments hit upon the expedient of inoculating the brain of the animal with the virus of rabies. The skull is trephined with a small instrument, and the virus introduced.

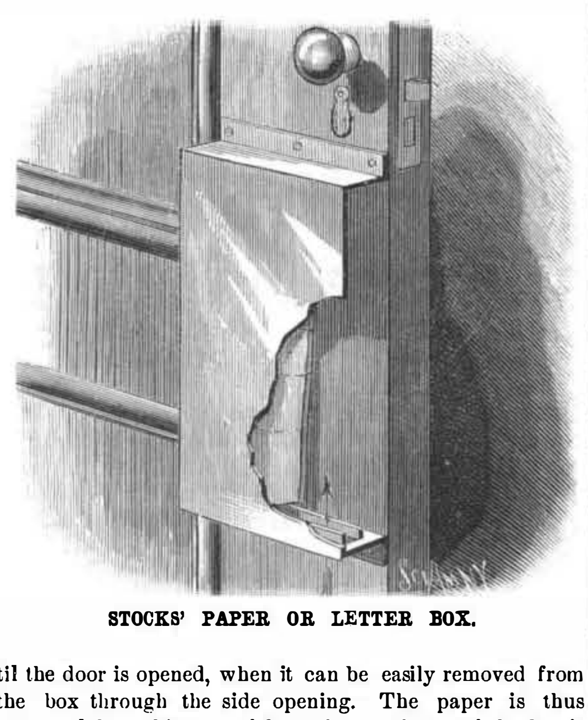
By this method the action of the virus is much hastened, the effects being manifest in a few days, instead of from twelve to fourteen days. In fact, Pasteur thinks he has in this way demonstrated that rabies is a malady of the brain. In the course of his experiments he found that the virus, after having passed through three monkeys in succession, becomes so attenuated that its introduction into a dog is harmless. But when the virus is passed through the rabbit and Guinea pig in like manner, it increases in virulence, becoming more virulent than the virus of the rabid dog. The plan proposed is to take the virus from a rabbit dying after inoculation, and inoculate this successively in other rabbits, and finally in the dog, which is thus rendered refractory to the rabies.

The test experiments proposed by Pasteur consist, first, in causing twenty unprotected dogs and twenty "vaccinated" dogs (presumably protected thereby from poison) to be bitten by dogs in a rabid state; and, second, in artificially inoculating with the virus of rabies two other sets of twenty dogs, respectively vaccinated and unvaccinated. "The twenty vaccinated dogs," says Pasteur, "will resist the poison, and the other twenty will all die of madness."

The importance of this discovery, if true, cannot be overestimated, but we must not be too ready, the Canada *Lancet* says, to express unqualified approval and indorsement of Pasteur's views. It will be observed that he uses, contrary to what one would have supposed, the virus from rabbits, and not the attenuated virus from monkeys. Furthermore, he does not propose to apply the virus for the protection of human beings, although we have read in the press that persons applied to him for inoculation. The experiments so far do not seem to us convincing, and we wait with considerable curiosity, mingled with not a little anxiety, the report of the commission. The result of these trials can hardly fail to be largely decisive of the question one way or the other, and will be an unequivocal illustration of the value of experimental pathology. Meantime, we agree with the man who said that the best way to prevent hydrophobia was "to shoot the dog before he went mad."

PAPER OR LETTER BOX.

A flat box having an open side and one of the longitudinal edges open is secured to the door in such a manner that when the door is closed the open edge of the box will rest against the side of the casing, which thus covers the opening. In the lower end of the box is a slot, the side edges of which are turned inward to form upwardly projecting flanges. When the door is closed the paper is pushed up into the box through the bottom slot, and as the edges of the paper distend after it has been pushed in, they rest over the flanges, thus making it impossible to pull the paper out of the box through the slot. The paper is thus secured until the door is opened, when it can be easily removed from the box through the side opening. The paper is thus protected from thieves and from the weather, and the box is simple in construction and cheap.



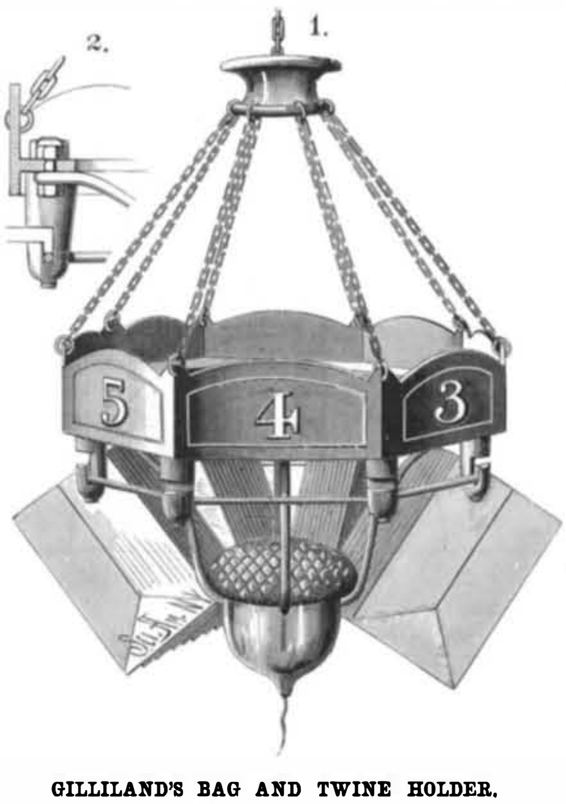
STOCKS' PAPER OR LETTER BOX.

This invention has been patented by Mr. Harry Stocks, and particulars may be obtained from Messrs. Campbell & Hanscom, of Lowell, Mass.

BAG AND TWINE HOLDER.

The bags are strung upon wires carried upon posts depending from a horizontal flange formed on the inner face of the octagonal ring. The wires are held to the parts by a hinge connection at one end of the wires, the hinges being formed by bending down the ends of the wires and passing these portions through holes in the lower ends of the posts, the pins being headed below the posts to hold them in place. The slots in the lower ends of the posts not only afford a means of connecting the hinge pins, but serve as guards to the pointed ends of the pins, which spring into the upper parts of the slots and lodge in the lower parts. The twine holder is made in the shape of an acorn and is attached to the ring by arms.

The cover is held in place by lugs on the lower portion,



GILLILAND'S BAG AND TWINE HOLDER.

which engage the inner edge of the cover when the slots in the cover—which pass over the lugs when the cover is put on—are turned around either way to carry the slots out of line with the lugs. Chains connect the octagonal ring to a collar which is fitted with a swivel hook, in the eye of which a chain is placed to suspend the bag and twine holder at a convenient height above the counter. Figures are cast or painted at the center of each plane face of the ring, to indicate the sizes of the bags held by the wires. In attaching the bags, the points of the wires are lifted from the slots and the bags strung on. The upper edges of the wires are made angular, to facilitate tearing the bags from them.

Further particulars relating to this invention may be obtained from the patentee, Mr. E. I. Gilliland, of Salt Lick, Pa.

Inventions Wanted.

Under this or similar headings the editor of the SCIENTIFIC AMERICAN has frequently called attention to inventions needed or to special manufactures for which there was a present demand.

There is hardly any field of invention which has been so little cultivated as the American house. For instance, what a disgrace it is to the mechanic arts in this country that every stick of timber in every house is not fireproofed by a cheap, practical process, the plant for which should become the second thing after a sawmill to be rected in every new settlement! For want of a cheap, practical process for fireproofing wood, one hundred million dollars' worth of property are destroyed ever year in the United States. The carpenters have hitherto opposed such processes because the mineralized wood is less easily finished with the common tools. But a large part of all the wood in a house is used in the rough, and this objection need not apply to it. For the finished wood let the fireproofing and steam seasoning be done together, after all the finishing has been completed except the final fitting. For the final smoothing, if edge tools will not work, let us have new tools, carrying pumicestone or other abrading and polishing material.

We are entering on a new and more complex system of domestic architecture—the family club house or social palace—which will require a host of new inventions. It is not looking very far ahead to see whole towns built in this way. These buildings must have their internal railways and elevators of all sizes. They must be tunneled for hot and cold air flues, ventilating flues, with artificial draught, steam, gas, water, and sewerage pipes, and speaking tubes. They must be equipped with an electric generator and electric wires for light, power, and telephony, with artificial refrigerating as well as heating apparatus, with gas generators, and the most perfect cooking and washing machinery. All of this machinery must be made on a large scale, with a capacity of subdivision.

There is, at the present moment, one desideratum in the modern house for which no sufficient provision exists, and which would insure a number of fortunes to the parties who would introduce the wished-for article in a cheap and practical form. This is a small elevator, run by the water in our city pipes, of no greater power than *fifty pounds raised ten or twelve feet*, applied to running the common dumb-waiter. This little simple invention would be a very important labor saving machine in the average house with a basement kitchen. It would save its own cost in broken crockery and servants' wages, not to speak of the temper of employers and employed.

There is room for a dozen manufacturers to advertise cheap, practical little elevators for this purpose in the SCIENTIFIC AMERICAN. Once introduced into our city houses, no house with a basement kitchen could go without it. The automatic dumb-waiter would have an enormous distribution. WM. F. CHANNING.

Taking Down a Chimney.

From a paper entitled "Chimney Construction," by Messrs. R. M. and J. F. Bancroft, we take the following interesting account of an ingenious arrangement employed for taking down a chimney shaft in Middlesboro', England, the method followed being necessary, as the chimney stood in a crowded position, and therefore could not be thrown down. The bricks had to be lowered with as little damage as possible, so that they might be used again for building purposes. Owing to the position of the chimney the bricks could not be thrown down outside, and if thrown down inside they would have been smashed, or if lowered by mechanical means the process would have been very tedious, and was impracticable. Under these circumstances it was considered whether the bricks could not be allowed to fall by their own gravity, and at the same time be cushioned sufficiently to break their fall and prevent damage. In order to do this an airtight iron box was placed at the bottom of the chimney; this box was fitted with an airtight door mounted on hinges, and closing on an India rubber face, against which it was tightened by a wedge.

A wooden spout was then fixed to the top of the box and carried up the chimney; it was 3½" x 5" inside, and was made of planks 1⅛" thick, well nailed together, with a little white lead on the edges, thus making it airtight. The spout was made in about twelve foot lengths, and these were joined together by cast iron sockets or shoes, and corked round with tarred yarn, the whole apparatus costing about $30. A few stays were put inside the chimney to keep the spout steady, and steps were nailed upon it, by which the men ascended. It will be seen that the whole of the spouting being airtight, if a brick filled the spout it would not descend; but as the section of a brick is 3" x 4½", and the spout was 3½" x 5", there was a quarter inch space each way through which the air could pass the brick freely, the space further allowing for any irregularity in the sizes of the bricks. The result was that the bricks, being cushioned in their fall, arrived at the bottom without any damage. As soon as the box was full the man at the bottom rapped on the spout as a signal to stop, and then opened the airtight door and removed the bricks inside. This being done he shut the door and signaled same to the man at the top. The man on the top lowered his own scaffold, and as the spout became too high he cut a piece of with a saw. If there was much mortar adhering to the bricks, it was knocked off before putting the latter into the spout, and such mortar, etc., was allowed to fall inside the chimney, and was afterward wheeled out.

STAMP AND ENVELOPE MOISTENER.

The engraving shows an apparatus for moistening stamps and adhesive envelopes that was recently patented by Mr. D. G. Beaumont, of Laredo, Texas. A box made of any desirable material and of convenient form may be adapted to contain water, or may be provided with a removable water reservoir. The cover is formed with an oblong

BEAUMONT'S STAMP AND ENVELOPE MOISTENER.

aperture to receive a wheel upon whose periphery is a covering of cloth or other suitable material which dips in the water in the reservoir. After revolving the wheel so as to saturate the covering with water, the stamps are moistened by pressing them lightly against the covering; this plan avoids the inconvenience of moistening them with the tongue, and also removes very little of the gum.

The Excavation of a Great Cut in France.

The railroad from Saumur to Chateau-du-Loir, after leaving the valley of Loire, crosses an elevated plateau by a cut 1,640 feet long and with a maximum depth of 62½ feet; the cubic contents equaled 274,500 cubic yards.

The material belongs to the Tertiary period, the Eocene; it is made up of a bed of clay inclosing large bowlders of a pudding stone formation, lying in distinct strata, about 17 feet thick; under this is a bed of white clay, 29½ feet thick, traversed by small veins of sand; beneath this again is sand.

The method of removal adopted was as follows: A gallery or tunnel was driven into the cut at its base, and this tunnel was connected at intervals with the surface of the cut by vertical shafts located on the axis of the cut. These wells were then enlarged from the top by giving them a funnel shape, and the material thrown directly into the cars placed beneath, at the bottom of the shaft. The tunnel was driven from both sides.

The tunnel was timbered as in a mine; two posts and a cap of oak 10x10 inches, spaced about 5 feet apart, with lagging of poplar planks 10x1½ inches and 6¼ feet long. The gallery was $7\frac{8}{10}$ feet high and 11½ feet wide in the clear.

While the tunnels were being driven, the wells were also sunk. At the bottom of the wells the caps of the tunnel-timbering were tied together longitudinally by braces spaced 3½ feet apart, thus forming a kind of box and strengthening the upper part of the gallery; four of the covering planks covered this space.

As soon as the wells were finished and the tunnel driven, the removal of the material commenced. The workmen began by breaking away the earth at the top of the shaft by bars and throwing it into the opening. As soon as the slope of the cone thus formed became too flat to permit the free motion of the debris, the cone was deepened so as to present a steeper pitch. One man in the gallery was all that was required to regulate the fall of the earth into the cars. At this cut only two wells were worked at a time; this was sufficient to furnish a cube of 600 cubic yards daily. By this method timber was saved, and the tunnel advanced by reusing that from the portion of the cut finished.

The train of empty wagons was drawn in by three horses, and the horses and their driver were prisoners in the tunnel heading while the filling was going on, but as no relays of horses were thus required, an interval of rest was afforded. The loaded cars descended by gravity to the dump by reason of the grade of the road.

In this method of excavating, it is advantageous to have cars as large as possible so that they may be less frequently moved; at the cut in question the cars contained 4¾ cubic yards and ran upon a track of 5 feet gauge. As each movement of a car corresponds to a stoppage in the excavation, as soon as the bed of sand was reached the engineer, to avoid the loss of time from this cause, put a stop valve at the bottom of the well.

The valve was made by placing upon a timber framework a sheet iron cylinder 3 feet in diameter, closed at the bottom by an iron door, like that used on a beton mixer. This door moved horizontally in guides, and was pivoted at one side.

When the successive funnels met at the top, a series of cone-like excavations of great width were presented, and it only remained then to cut down and remove the walls of earth lying between the cones.

The cost of the timber for 1,200 feet of tunnel, including the timbering of the shafts, was $782,

The manual labor and expense of driving the tunnel amounted to $1.83 per lin. foot. The total expense was as follows:

Timber for tunnel and shafts	$782.00
Labor and tunnel advance, @ $1.83x1200	2,196.00
Sinking 4 wells at $20 (100 frs.) each	80.00
	$3,058.00

Dividing the total cost by the contents of the cut, 274,500 cubic yards, we have as the cost per cubic yard about 1·1 cents (0·074 fr. per cubic meter).—*Genie Civil; Engineering News.*

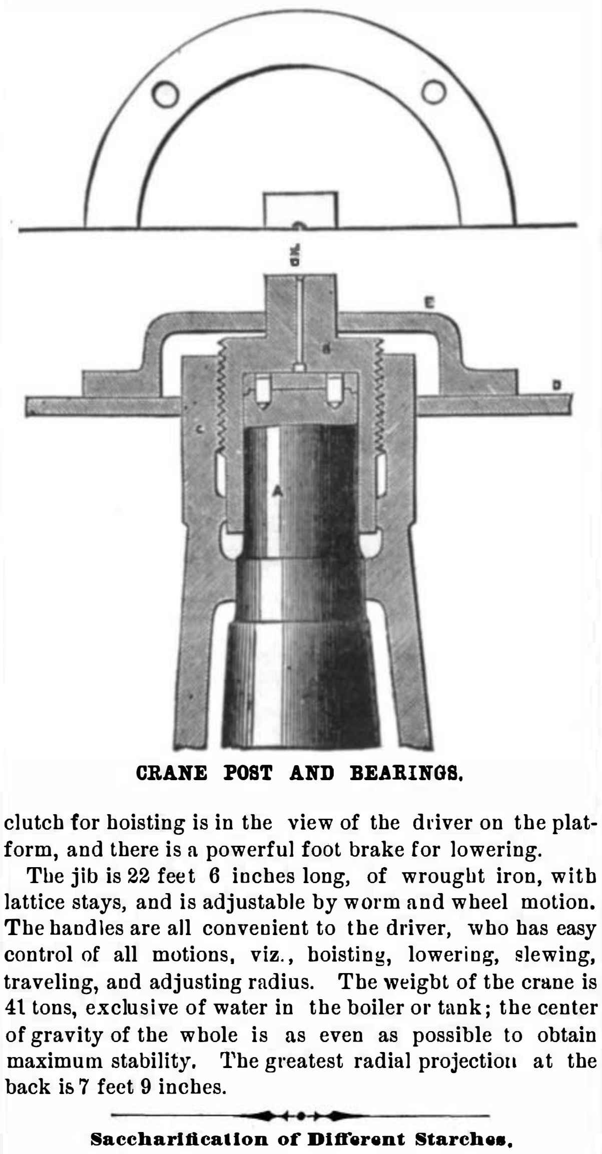
Painting Shingled Roofs.

More shingle roofs are painted now than ever before in the history of building in this country. It is mostly seen in cities and suburban towns, although in the country it is by no means rare. Considerable inquiry has led to the conclusion that many have their roofs painted to add to their appearance, which in many cases it certainly does, while others labor under the impression that the paint acts as a preservative to the shingles. The latter are probably right, provided the paint is renewed as often as it needs to be. If the roof is allowed to remain with the paint partly worn off the shingles will retain more moisture, and consequently decay sooner then they would were they not painted at all. On the score of durability, however, little can be gained in cost by painting. A good shingle roof unpainted will last a great many years, and the expense of painting it a few times would replace it. One painter, who had painted the roof of his own house, when questioned by a representative of the *Lumberman*, used good logic from his standpoint. He thought that painting a roof would add somewhat to its length of life. "You see," he said, "that I have painted mine. I do for myself what I desire to do for others. If I did not, the influence would be bad."

FOURTEEN TON LOCOMOTIVE CRANE.

(*Continued from first page.*)

post and bearings. The post is a wrought iron forging, A, fixed in the carriage, with a bearing at top and bottom, on which the crane revolves. The weight is carried on a steel plate fixed on top and the steel bush, B. This bush is screwed into a jacket or case, C, which is continued down to the bottom bearing. The post is thus entirely inclosed, and no dust or grit can find access to the bearings. There is a square head on the bush, to which is fitted a large cap, E, fixed by four bolts to the cross girder, D, which is a wrought iron plate. The bush can be adjusted by screwing it in the case to maintain the crane at a constant level above the carriage, taking up any wear. It can also be removed and replaced for inspection or cleaning in a few minutes. On unscrewing the bush the crane settles down about a quarter of an inch lower than the working level, and rests on the carriage till the bush is replaced. The side frames are of massive proportions, with brass bushes and covers for the various bearings of the shafts. There is a large balance weight of 8 tons under the boiler, with ash space and self-discharging arrangement. The boiler has two cross tubes in the fire box, and is double riveted in the vertical landings. A capacious tank is carried on the opposite side to the platform. The engines have a pair of 8 inch cylinders, with link reversing motion of steel. The crank shaft is balanced by weights to prevent vibration. The disengaging



CRANE POST AND BEARINGS.

clutch for hoisting is in the view of the driver on the platform, and there is a powerful foot brake for lowering.

The jib is 22 feet 6 inches long, of wrought iron, with lattice stays, and is adjustable by worm and wheel motion. The handles are all convenient to the driver, who has easy control of all motions, viz., hoisting, lowering, slewing, traveling, and adjusting radius. The weight of the crane is 41 tons, exclusive of water in the boiler or tank; the center of gravity of the whole is as even as possible to obtain maximum stability. The greatest radial projection at the back is 7 feet 9 inches.

Saccharification of Different Starches.

In spite of all that has been written and said concerning the saccharification of the different starches since brewers have been allowed to use unmalted grain in their mash tuns, there is still, says the *Brewers' Guardian*, much difference of opinion, and the practical applications of theoretical opinions have not always been attended with success. In dealing with the conversion of starch into sugar, the fact has frequently been overlooked that starches vary very considerably; the starch of barley is in many respects different from the starch of maize, and the starch of rice differs from both; this difference is not in the chemical composition, for all the starches are identical in this respect, but in their physical properties; the size and aggregation of the different starch cells have a most important bearing on the problem which has eng^ ed so much of the attention of brewers of late. From the following table it will be seen how greatly the cells of the starches vary in size; the dimensions are given in decimals of an inch.

Potato	0·00270 to 0·00148
Maize	about 0·00074
Dari	" 0·00074
Wheat	0·00185 to 0·00009
Barley	about 0·00073
Oat	" 0·00037
Rice	0·00020 to 0·00002

It will thus be seen that the sizes of starch cells vary between very wide limits, and it has been established by some experiments of Symons and others that the smaller sized starches resist the action of moist heat much more than the larger ones; the cells of potato starch, for instance, tumefy and burst at a temperature several degrees below those of rice starch; this question of the tumefaction of starches has a very important bearing on their saccharification, and scarcely sufficient attention has yet been paid to the subject. The larger the starch cells, the more compact and dense are their cell walls, and thus the greater is the resistance to the disintegrating influence of heat; diastase, also, has comparatively little action on the outside of the starch cells; the cells must be burst or broken, so that the diastase can penetrate into the interior for this agent to exert its full saccharifying action. If this view be correct, the difficulty of conversion of the starches must be in direct proportion to the sizes of the cells, and the experience of practical men will probably confirm this, for although rice is a brewing material which presents many advantages as regards price and purity, it is not saccharified with the same ease as maize or potato starch, unless previously submitted to some treatment by which its starch cells are ruptured. Before the solution of this problem can be satisfactorily effected, the physical as well as the chemical properties of starch must be taken into consideration, and it is in this direction that further investigation is needed.

Gerome Cheese.

The following is a description of the manufacture of a very popular cheese, known in France under the name of Gerome. It is largely consumed in Paris just as it is ripe, and it would be difficult to mention any cheese which is more delicious at this particular period. It is a soft round cheese, varying in weight from 4 pounds to 8 pounds, and is sometimes made with the addition of aniseseed. It is made with milk at the temperature at which it comes from the cow, this being placed in a deep copper vat holding some forty-five quarts, when it is covered with a wooden lid, in the center of which is inserted a wooden funnel resembling in form a cup. To the bottom of this is attached a cloth for straining. When this is not used, a small disk is drawn over the hole. The rennet is immediately added, in quantity according to the weather and its strength.

In half an hour the whey is divided from the curd with a ladle, and the vat recovered. In another half hour the separation is continued, with the aid of a copper strainer, 12 inches by 4 inches. When the curd is divided into pieces about the size of a small nut, it is taken out and placed in wooden cylindrical moulds, from 5 inches to 9 inches in diameter. Two moulds are used for each cheese, the one being fixed into the other, which is somewhat larger in diameter, and has a number of holes pierced in the bottom. The total height of the two when fixed is from 14 inches to 16 inches. The curd entirely drains in this mould, and at the end of about twelve hours it will have sunk to about the height of the bottom and larger part of it, so that the top part can be taken off. The cheese is then placed in another mould of the same diameter as the bottom one, and put upon a shelf upside down. After six hours it is again turned, and this turning is continued twice daily for the two following days.

In draining the whey the moulds are placed upon sloping shelves, which are furnished with a rim at the edge, as in the Camembert cheese rooms in Normandy. The whey runs off, and is collected in a receptacle placed at the side of the table for the purpose. The temperature of the room in which this operation takes place should be from 59° to 64° Fah. The next thing to be done is to salt the cheeses, which for this purpose are placed upon small boards made of beech, and upon which layers of fine salt are sprinkled. The surface of the cheese must be well salted, and the operation repeated every three or four days, care being taken that it is turned each time. This turning is continued twice daily for three days after salting, and the surfaces of the cheeses each time are gently moistened with tepid water. When sufficiently dry on the crust they are removed to the drying room, 30 grammes of salt having been used in the salting process. In this *sechoir*, or drying room, the cheese shelves are built one above the other, so that large numbers of cheeses can be kept in a small space and well cured, provided the temperature and aeration are complete. In summer the process of ripening is frequently conducted in the open air, the cheeses being protected with cloths to keep off flies and the sun; but during the other parts of the year a specially prepared room is invariably used.

When thoroughly dry they are removed to the cave or cellar for the completion of the process, and here they are very carefully managed. This cave must be in good condition, with a draught of air passing through it; but if the temperature is too low, the cheeses crack and lose quality. The time they remain here is determined by the season and the size of the cheese, the maker judging this for himself. The largest, however, are usually kept from three to four months. While in this compartment they are often turned, and washed with tepid water slightly salted, and daily examined to see whether they are ripening too rapidly. When they are brick-red in appearance and the surface sufficiently firm to yield to the pressure of the finger, they are ready for market. A good Gerome is firm on the exterior, rich, and oily, and has a few small holes in the interior; while inferior makes, like inferior Gruyere, have numbers of large holes, are fragile, easily crumble, and sometimes become soft and pulpy when the whey has not been properly extracted from them.—*London Grocer.*

Platinized Magnesium.

M. BALLO.—Magnesium, which has no action upon pure water, decomposes it instantly in presence of a trace of platinum chloride.—*Zeit. f. Anal. Chem.*