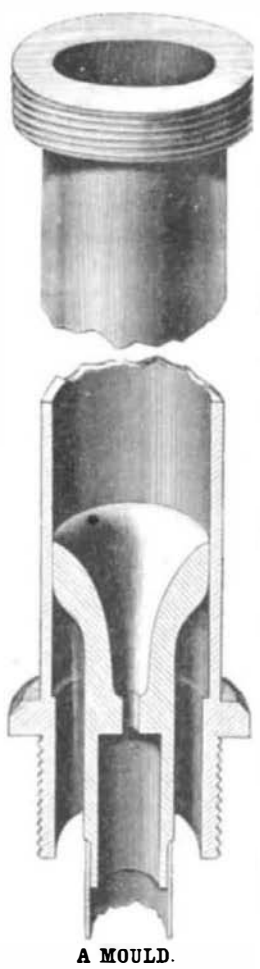
has been melted out of the barrels by steam, is run and is mixed with lime and water. The mixture is kept at a heat of 600° Fah. by steam which is let into the outer cylinder at a pressure of two hundred and fifty pounds to the square inch. The water, being the heavier, sinks to the bottom of the copper cylinder, whence it is pumped and thrown on a perforated plate above the fat, that it may fall through it in many little streams. This agitation is kept up for eight or nine hours, after which it is found that the lime has united with the fat acids and formed a soap, while the water has consorted with the dissociated glycerine. The contents of the cylinder, after being permitted to remain at rest for a time, separate into two strata, the lime soap on top, the crude glycerine and water below. These are blown off to separate vats by the power of steam. It is from the candle factories that the enormous supply of glycerine comes, which is now a very important article of trade. A few years ago it was wasted; now it is sent to the manufacturing chemist, who purifies it by distillation and filtration through bone charcoal, and puts it upon the market. It is put to a great variety of uses, many of which depend upon its peculiar properties of non-volatility and absorption of atmospheric moisture. Harness makers and leather workers use it in making leather pliable; it is put into gas meters because it does not freeze except at a very low temperature; modelers keep their clay studies moist with it; tobacconists sweeten chewing tobacco with it, and ladies apply it to their hands and faces to soften the skin. Much of it goes into the manufacture of the terrible explosive nitro-glycerine, which is made by treating it with a mixture of sulphuric and nitric acid, or concentrated nitric acid. Not less than three million two hundred thousand pounds of glycerine are produced by the candle factories and utilized every year in this country, and yet so late as the year 1854 it was counted as worthless, and was run off into the sewers.

When the French chandlers first began the manufacture of the new-process candles, and for a long while after, they permitted the lime soap to become hard, and then ground it up in order to dissociate the lime from the fat acids. Now this is done without delay, the liquid soap being run into lead-lined vats with a proportion of sulphuric acid added. The chemical principle involved is the same as in the more laborious process of saponification; the glycerine base has been supplanted by the lime base, and this must now be got rid of. The sulphuric acid takes hold of the lime, forming sulphate of lime, and the acids float off free. In these vats, between which the paths are narrow and the walks greasy, the liquid settles in three strata—the first, the fat acids, now free of their base, but still mingled; the second, an acid water; the third, sulphate of lime, a waste. They are easily drawn off without mixing, and the fat acids, by washing in boiling water, are cleaned of all traces of the sulphuric acid, and we are now done with the chemical processes, and our product is a fat which contains the solid and the liquid acids. If cooled rapidly or kept agitated while cooling, the acids become so intermingled that they cannot be separated by mechanical means, which at this stage of manufacture must replace the chemical, on the score of cheapness. If the fat is cooled very slowly, however, it has been found that the solid acids will crystallize, while the liquid acid, the oleic which it is desired to banish, will lie snugly ensconced between the crystals, to be afterward forced out by heavy pressure.

The cooling of the fat is a slow process. It is run into shallow pans, lined with enamel to prevent the acids from eating the metal, and permitted to remain in a warm room two or three days. These pans are arranged in sections, like alcoves in a library, one row of pans underneath the other, and each extending a slight distance alternately to front or rear beyond the one above it. The hot fat is conducted over the top of the alcove in a wooden chute, and the filling of all the pans down to the floor is accomplished by taking a plug from the chute immediately over the top pan. When this is full it overflows at the front end by means of the slight depression made at that end, and the overflow is caught by the pan below, and so on down to the bottom. When the fat is become hard it is a cake of a brown, greasy mass, not unlike unrefined maple sugar. The discoloration comes from the oleic acid, which permeates the whole cake and can be forced from between the crystals of the hard acids by pressure with the thumb. The cakes are wrapped in heavy woolen cloths, piled into hydraulic presses between iron plates, and the pressure applied. A dark oil gushes from the woolen, pours over the edges of the plates, and is caught up beneath the press to be used in soap-making. The cakes have now been squeezed down to less than two-thirds of their original thickness, and the mass presents a yellowish-white appearance. By breaking it, its crystalline texture can still be seen despite the fact that the shape of the crystals has been ruined by the pressure it has undergone. They are still somewhat greasy to the touch, for in this first pressure only fifty per cent of the oleic acid has been removed. They now succeed to a second pressure, this time in a horizontal press, and between hollow iron plates that are kept hot by steam. Still wrapped in the woolen cloths, they are suspended between the plates in bags of horsehair cloth, and a very heavy pressure is applied from the end. When the cakes issue from this process they are as white almost as snow, very hard and dry, and when broken into small particles have a flaky appearance. The mass is now almost pure stearic acid, and is ready to be moulded into star or adamantine candles. Without an exception, this single hot pressing is deemed by other manufacturers to be sufficient for their higher grades of candles, such as are used for mining, dining room, or library, but Messrs. Procter & Gamble have learned that by again breaking up the cakes, melting, panning, and pressing in the hot press, a much better candle is produced, better because there is no smoke, the light is whiter, and consequently much stronger, and the candles last longer. These are strong points, especially where the candles are to be used for mining or in a close room, or where a pure, soft, white light is desirable, such as at a dinner party or reception.

STAMPING.



A MOULD.

These are the scientific phases through which the stearic acid candle goes; what follows it is simply the fruit of the inventive faculty of our day. The visitor emerges from dark basement rooms, where he has been moving between tubs and under pipes and chutes all dripping with liquid grease, into a room on the ground floor. Here there is light in plenty, and opening off one side is a vista of a room vast in extent, with a glass roof like a hothouse, with long rows of tables separated by narrow paths, on which, bolt upright, stand thousands of shapely candles undergoing a brief bleaching process by sunlight. One end of the first room is filled with vats in which the prepared candle fat is melted, purified, sometimes colored, and brought to the temperature requisite for moulding. Utility is here, of course, the guiding consideration, but the group of big and little tubs, with the men moving among them, is not without its picturesque element. Upon the edges, and hanging from the spouts at which the moulder fills his double-lipped can, the candle fat has hardened in fantastic shapes, with surfaces of ivory-like smoothness and sheen. The floor of the room is covered with moulds. In these moulds there is little remaining of the group of tin tubes through which the domestic candle maker, who had got beyond dips a few years ago, laboriously drew her wicks, to fasten them below with a knot, and above by looping them over little sticks. The tubes are now fixed in a frame having troughs along the top, into which they all open. They end below with the shoulder of the candle, and the moulds for the tips are the upper ends of piston rods, which, by a rack and pinion, are forced upward through the tubes to expel the candles, and which, when at rest, fall snugly into the shoulders. These rods are hollow, and the wicks pass continuously through them from bobbins placed in the floor of the frame. Care is exercised to have the fat at a temperature just above the melting point, to heat the mould to receive it, and immediately to cool it rapidly by forcing around the tubes a blast of cold air, so that the fat shall not crystallize as it did in the panning. When the candles are hard, the surplus fat in the troughs is removed, and a few turns of a handle forces them upward out of the moulds and into a rack placed on top of the machine to receive them. The lower board of the receiving rack is slightly shifted, so that the edges of the openings through which the candles pass catch the shoulders of the candles, and prevent them from dropping back into the moulds with the piston rods. These rods in expelling the candles draw up with them wicks for the next pouring, and in falling back into position pull the wicks taut and into place through the middle of the tubes. The candles in the rack are left until the next mouldful is cold; then the wicks are cut by passing a knife between the mould frame and the rack, and they are emptied into boxes, which are mounted on trucks, and pushed from mould to mould. Bleaching, polishing, stamping, and packing are all that remain to be done. The first process takes place in the adjoining room already mentioned; a few hours of sunlight bleaches the yellowish tinge out of the fat. Common grades are then rubbed with cloths and packed; better grades are polished by a machine, into one end of which they are fed by one woman, while another packs them into boxes from the other. The process is very simple: a grooved cylinder receives the candles from the feeder, and after carrying them past a revolving saw, which cuts off the butts evenly, deposits them upon a bed plate between the rods of an endless frame with linked sides, kept in motion by cog wheels. Over this bed plate they roll under a revolving buffer, which gives them a vigorous brushing from end to end, and gives them the beautiful porcelain finish as they pass toward the end where they roll off into the packer's box. All grades are stamped with the name of the maker, and in some instances the trade name of the candle, "Composite," etc. This stamp is melted into them by a branding iron as they pass through a small machine, which, like the polisher, is fed by a grooved cylinder.

MISCELLANEOUS INVENTIONS.

Mr. John B. Casley, of Coolville, Ohio, has patented an improvement in metal roofing. This invention relates to that class of metal roofs in which the ends of the sheets are bent upward to form flanges which are held on the roof by anchors. The invention consists in the combination, with flanged roofing plates, of an anchor provided with one or more prongs at the upper end and with an enlargement or bead at the inner end. This anchor is passed into a slit or cut in the edge of the roofing strips or boards, the enlarged part or bead resting against the inner surface thereof, whereas the prongs project above the flanges of the metal sheets, and are then bent down over these flanges. The flanges may be bent one over the other, or the joint may be covered by a cap. By this invention the plates are held firmly by the anchors, and can be attached to the building very rapidly and conveniently. The plates can be attached to the sides of a house in the same manner.

A very efficient carpet stretcher has been patented by Mr. David G. Rulon, of Monmouth, Ill. In this device a clutch bar, which lies flat upon the carpet, and has inclined steel points that catch into the latter, is connected by cords or chains with a rear bar, which is provided with steel points that pass through the carpet and into the floor. The clutch bar is moved forward to stretch the carpet by a lever having a steel point that sticks into the floor, said lever passing through a loop in a draw cord, that rests by its loop in any one of a series of hooks on the lever, while the ends of the cord are connected with the clutch bar by draw rods, which keep

said bar from turning. After the carpet has been fully stretched, the clutch bar is carried over and behind the rear bar, out of the way, to provide for tacking the carpet down near the wall.

An improved spring lock earring has been patented by Mr. Fred R. Bassett, of Paw Paw, Mich. The invention consists in hinging the hook to the pendant, and providing a spring for holding the hook open or closed, the hook being formed with square faces at the pivot for the impingement of one end of the spring upon either one of said faces, accordingly as the hook is thrown open or closed. This improvement not only gives greater convenience in attaching, fastening, and removing the ring from the ear, but less gold wire is required for the hook, no eye is needed for fastening the end of the hook, and the hook is not liable to be broken, as it does not have to be bent every time the ring is inserted and removed from the ear, as is the case with the ordinary style of hooks.

An improved sofa bed, which is free from complicated devices to adapt it for use as a sofa or a bed, and which may be so adapted without unduly stretching or crowding its upholstering, has been patented by Mr. Herman A. W. Maercklein, of Hartford, Conn. In this improvement the hinged back and main frame of the sofa have combined with them hinged plates, which, when raised or closed, hold the back in a vertical position, and, when lowered, permit the back to occupy a horizontal one. The stationary sofa arms and the lowering back have also combined with them bolsters hinged to said arms at their rear ends and avoiding the appearance of a hinge joint at the sofa front. Furthermore, the back and seat are connected by hinges having pin joints on a line with the tops of the springs in the seat, whereby all undue crowding and stretching of the springs are avoided.

Mr. King G. Streeter, of Littleton, N. H., has patented a very neat and durable glove fastening. In this device a tubular shank, having an eye on its outer end, is secured to the glove on one side of the wrist opening. Through this eye is loosely fitted a wire bent in reverse directions at its opposite ends, which latter have knobs that prevent the wire from dropping out of the eye. In using the fastener, one end of the wire is passed through the button hole in the glove wrist, and said rod or wire then used as a lever to draw the parts of the glove wrist together. The other end of the rod is next passed through the button hole, and the rod afterwards adjusted to bring its central portion within the eye. The button hole is fitted with an oblong eyelet to prevent the glove wrist from being worn or torn around the button hole.

A simple and inexpensive fastening for hats and bonnets, which may be secured in position without the use of needle and thread, has been patented by Mrs. Josephine A. McK. Bouvier, of Denver, Col. The invention consists in a button having a portion of its back cut away to form an opening, and the remaining portion of said back provided with a keyhole slot, which communicates with said opening, and is adapted to receive a knotted cord. This cord, which may be elastic, being thus secured at its one end, without sewing to the button, may be attached at its other end to the hat by a clasp, and said button, when securing the hat to the head, be passed through a looped cord secured to the other side of the hat by clasp or otherwise.

An improved ore concentrator, which is designed to be connected with crushing rolls or other crushing machines, or to receive the ore directly from them, has been patented by Mr. William Thurmond, of Rosita, Col. In this concentrator a V-shaped box set slightly inclining from a horizontal position, and formed with an enlarged cylindrical chamber at its narrowest end, is connected at said end with an exhaust fan and provided at its opposite end with a current regulating slide. Within the V-shaped chamber of the box is a rocking or vibrating frame, having screens of various degrees of fineness for separating the different grades of crushed ore, while the dust and lighter particles are drawn out by the fan. Chutes in the bottom of the box conduct the graded ore to suitable receptacles, and a separate chute carries off the gangue. Ore concentrators thus constructed are said to perform their work perfectly.

An improved tire-tightener, which operates by expanding the felly of a wheel to completely fill the tire and thus firmly unites the felly and the tire, has been patented by Mr. Benjamin F. Carlon, of Red Oak, Iowa. The device consists of two arms having jaws and binding screws at their outer ends to receive and hold the felly, which arms are pivoted to a forked swivel head loosely mounted in the top of a capstan head on a screw which fits into a threaded aperture of a pedestal or base that rests against the hub of the wheel between the spokes. By turning in a given direction the capstan head of the screw the felly will be expanded as required, and washers can be passed into the joint to fill up the space between the ends of the fellies. This useful contrivance may also be used as a jack to lift wagons and other loads.

An improvement in photographic apparatus, which possesses both novelty and merit, has been patented by Mr. David H. Houston, of Cambria, Wis. The object of this invention is to facilitate taking a number of photographic views successfully and in a short time. The invention consists in a camera with a receptacle or box at its inner end containing a roll of sensitized paper or other suitable tissue, and an empty reel, upon which the sensitized band is wound as rapidly as it has been acted upon by the light, thus obtaining a number of views successively upon the same band, which is afterward divided as required. Said band is arranged to pass from the supply roll to the take-up reel, over rollers at a suitable distance apart and through slots in front of the box. On the shaft of one of these rollers is a pointer for indicating the amount of tissue drawn to form one negative, and a perforator on said roller for indicating the dividing points in the band for a series of negatives. The end pieces of the front end frame of the bellows of the camera also is arranged to swing on the sliding side pieces of the bellows box.

Correspondence.

Curious Freak of a Dog.

To the Editor of the Scientific American:

Being a constant and close reader of your valuable paper, and having gleaned many curious and instructive facts of natural history from its pages, it has occurred to me that the following freak of a dog which we own would not be uninteresting to some of your readers.

"Simmons" (that is the dog's name) is very remarkable for her sagacity, and often excites remark by the "reasonableness" of her actions. She is a constant companion of the boys, and seems to consider herself one of them. She has been a mother three times; the third time some ten days or so ago. At her two former *accouchements* she did herself credit by the respectable size of the family she brought to light; but this last time she gave birth to but one pup. Two or three days before the birth of this pup there was a litter of kittens born on the place. Simmons, disgusted at the smallness of her family, and evidently thinking that the cat had more than her share, captured one of the kittens in the absence of the old cat, and carried it in her mouth to where she kept her pup, and deposited it in her basket. In a short time she was suckling both the pup and kitten, who were hard at work side by side. The next day the kitten was taken away in the absence of Simmons, but on her return she hunted up her adopted child and brought it back to her basket, where it has remained until now. Simmons has now been nursing the kitten for more than a week, the kitten seeming to be perfectly satisfied with her foster-mother.

This may not be an isolated case of the kind, yet it is nevertheless remarkable.

H. U. ONDERDONK, M.D.

College of St. James, Washington Co., Md, Nov., 1881.

Rain of Spider Webs.

To the Editor of the Scientific American:

I notice in the SCIENTIFIC AMERICAN of November 26, 1881, an article headed a "Rain of Spider Webs." This rain occurred in Wisconsin in the latter part of October. It might be interesting to refer to another locality and another date, where and when a similar shower was seen. In this place (Bloomington, Indiana), on October 9, about two o'clock, my attention was called to the number of spider lines streaming from a telegraph wire running from the house at a height of about eighteen feet from the ground. At this time I did not notice any in the air, but going along the road I observed some webs on the fences, but not in great numbers. Returning to the house a little before five o'clock, we found the telegraph wire almost fringed with them; every two or three inches, as far as we could see, there were streamers of cobwebs of from four or five inches in length to about fifteen feet, all directed nearly horizontally toward the south. We now saw in the air many lines detached, drifting southward in constantly varying curves. These lines were plainly visible at a distance of over two hundred yards, glancing in sunlight reflected from or inflected by them. We observed, also, several tufts or "parachutes" floating with the spider lines.

I find recorded in my notebook another instance of the same kind. It occurred September 20, 1874. Noticed the appearance about five o'clock. The air at this time was filled with dust, the season being very dry. The long waving lines of light, whose general direction was nearly vertical, were seen drifting from north to south nearly parallel to the ground. They could be seen at the same distance as those already described. We watched them till sunset; for a few minutes but few could be seen, then the number would increase, but upon the whole there seemed to be no diminution as long as the sun shone upon them. The tufts of *gathered cobwebs* were more numerous than in the shower of October 9. T. A. WYLIE.

Bloomington, Ind., Nov. 22, 1881.

Cast Iron Flat Heads for Boilers.

To the Editor of the Scientific American:

As the question of the safety of cast iron "flat" boiler heads for cylindrical boilers appears again to have come to the surface, I give you below what has been the practice in past years by builders of high standing in proportioning such heads, and which have been used without accident.

The proportions of one builder are as follows: For boiler 24 inches diameter, heads 1½ inches thick; for boiler 28 inches diameter, heads 1½ inches thick; for boiler 30 inches diameter, heads 1¾ inches thick; for boiler 36 inches diameter, heads 2⅛ inches thick; and of another extensive builder: For boiler 30 inches diameter, heads 1½ inches thick; for boiler 36 inches diameter, heads 1¾ inches thick; for boiler 42 inches diameter, heads 2 inches thick.

I have also examined the heads of old boilers which had been in use for years carrying 80 lb. steam, heads 36 inches diameter and 1⅜ inches thick; and of others in use for years carrying 110 lb. steam, heads 36 inches diameter and 1⅝ inches thick. OBSERVER.

[The above data is furnished to us by an experienced steam engineer, and is brought out, we presume, by the recent publication, in the SCIENTIFIC AMERICAN SUPPLEMENT, No. 308, of Mr. W. Barnet Le Van's letter relative to the Gaffney boiler explosion, Philadelphia. In that letter Mr. Le Van states, among other things, that no competent engineer would approve of flat cast iron heads, especially 36 inches diameter and 2 inches thick. We think that Mr. Le Van is greatly mistaken. If the information we have received is correct a very large proportion of all the ordinary cylinder boilers now running have flat heads, have been run for many years in safety, and were originally, and are still, approved by competent engineers.—EDS.]

An American Triumph in Electric Lighting.

To the Editor of the Scientific American:

SIR: I have been somewhat surprised to find that no mention was made, except in the foreign papers, of an extraordinary test of electric lights made during the Electric Exhibition at Paris. It was a test made for the *Credit Lyonnais*, the great French financial institution, who were negotiating for the Brush patents for France, and consisted in running two 40-light machines in series burning 38 lights each, 76 lights in all, on a twenty mile circuit, 16 hours a day for 30 days. The lights, during the whole period, burned with great steadiness, and the test was so satisfactory that, at its conclusion, the patents for France were purchased for between $400.000 and $500,000. This is the largest sum that has been paid, I understand, for any electric light patents of any American inventor. The French company, I was told in Paris, had already begun an immense manufactory for the manufacture of apparatus.

C. C. RUTHRAUFF.

Cleveland, Ohio, Nov. 25, 1881.

Fall of a Meteorite in England.

BY PROF. A. S. HERSCHEL, M.A., F.R.A.S.

A stonefall took place at 3:35 P.M., on March 14, 1881, a mile and three-quarters from Middlesborough, in Yorkshire, along the branch line of the Northeastern Railway from Middlesborough to Guisborough, at a place known as Pennyman's Siding, on the railway. The fall was accompanied by the usual thunder-like report, not heard at the place where the meteorite struck the earth, but as far off as Northallerton and Welbury, in Yorkshire.

Some workmen's attention on the railway was drawn for about four seconds to a whirring noise overhead, followed immediately by a heavy thud in the ground near them; and on searching in the direction indicated by the sound, they found the stone, about three minutes afterwards, at the bottom of a hole eleven or twelve inches deep, which had formed almost vertically through an inch of coke ballast and through thin growing turf and stony clay below at the foot of the slight embankment of the railway, four yards from the nearest line of rails, nineteen yards from the signal box of the siding, and forty-eight yards from the place where they stood when they heard the sound. The foreman narrated the occurrence, and placed the stone in the hands of the engineer of the Darlington district of the railway, Mr. Cudworth, in whose possession it now remains as property of the railway company; but it was submitted to me on March 25 for examination, and on Saturday, March 26, I visited the place of fall with Messrs. Cudworth and Ellinor, and the workmen under them, and with some scientific friends. A photograph of the site, and of the group of men finding the stone, has since been made, and steps are being taken for preserving the hole in the ground in a box fitted and screwed together round the earth about it, which will be thus bodily removed.

The stone weighs 3 lb. 8 oz. 83 grains, and is of a low pyramidal shape like an upper oyster shell, 3 in. thick and rather less than 6 in. x 5 in. in length and breadth. The interior is visible at points of the frayed edge and is gray, with very little interspersed grains of iron pyrites, and apparently no iron; and a magnet is not sensibly affected by the mass. Its specific gravity roughly determined is a little greater than 3·0. The flat back surface of the meteorite is covered with a rough brown crust, while the blunt conical front surface is deeply scored and furrowed radially from the center, and polished like fresh molten slag and of a lead-gray color.

The singular form and contour of the stone make it very desirable that, whatever provision is finally made for its preservation and mineralogical examination and description, it should not undergo more defacement from its original integrity than is absolutely necessary.—*Monthly Notices R. A. S.*

Lead in Bromide of Potassium.

Maschke has found bromide of potassium in the market which is contaminated with lead. It is soluble to a clear liquid only after addition of an acid; the larger crystals are remarkable by their transparency and their form, being a compound of octahedra and cubes. In testing for lead, sulphuric acid cannot be used, since the resulting sulphate of lead is soluble in bromide of potassium. But if hydrosulphuric acid or sulphide of ammonium is used, no doubt can arise.—*Pharm. Zeit.*