RECENT INVENTIONS.

Mr. Eugene Wessells, of Peekskill, N. Y., has patented an improved automatic mechanism for feeding animals. It is designed to be operated by a heavy weight, and its movements are controlled by a clock.

An improved chamber vessel has been patented by Mr. Arthur Bird, of Jeffersonville, N. Y. The object of the improvement is to provide means for tightly sealing vessels used in sickrooms, hospitals, and other places, so as to prevent escape of gases and odors. The invention consists in swinging covers fitted for being opened and closed by hand or by movement of the seat.

Mr. Henry Eitenmüller, of Butler, Pa., has patented an improved beehive of handsome appearance, which affords ready means for the inspection of its interior, and an easy and convenient removal of the upper comb boxes and the improved comb racks in the brood chambers, means being also provided whereby the honey made in the hive shall be made more secure against marauding bees.

Mr. Samuel B Knapp, of Osceola, Iowa, has patented a device for attracting insects, which drop into a poisoned liquid in the apparatus, and are thus destroyed.

An improved billiard table on which a game can be played with two or more balls, has been patented by Mr. Edmond J. Sause, of Brooklyn, N. Y. The invention consists in a billiard table provided with the ordinary cushioned end rails, and with a central cushion attached to a stud projecting from the table.

PHOSPHORESCENT SUBSTANCES.

Phosphorescence, or the emission of light without flame or sensible elevation of temperature, is a phenomenon exhibited in a greater or lesser degree by many substances—mineral, animal, and vegetable—and is developed under a variety of conditions. In a few substances the light is developed by chemical change or a process of slow combustion, as in the case of phosphorus, from which the name phosphorescence has been derived. In others the substance suffers no appreciable change, only requiring exposure to a strong light to shine themselves when taken into the dark. The diamond and many mineral substances develop light in this way, and it is supposed that these substances have the property of absorbing light in the same way they do heat, and of slowly parting with it when taken into the dark much in the same way that hot bodies part with their heat when removed from the source of heat.

With some of these substances the application of heat causes the development of a brighter light (though for a shorter time than would be otherwise required to exhaust the supply); and again, there are some substances, such as fluorspar, that absorb light, but do not give it out until heated.

Many substances also become phosphorescent while crystallizing.

The color of the light developed by many of these substances varies with their nature and the degrees of heat to which they have been exposed. A certain scale of light and color may, therefore, be produced by grouping together different substances or samples of the same substances previously heated at different temperatures.

The following are methods for preparing some of these pyrophors:

BARIUM SULPHIDE.

Finely powdered barium sulphate, free from iron, is formed into balls with gum tragacanth; the balls are dried at a moderate temperature, then placed in a crucible with a luted cover and kept at a red heat for an hour. They are then allowed to cool slowly, and while still warm are transferred to glass stoppered bottles.

A better light is developed from the following charge:

Barium sulphate (C P.)	32 parts.
Magnesium carbonate (C. P)	1 part.
Sulphur (C. P.)	1 "
Gum tragacanth	q. s.

This is heated in the crucible as before described.

STRONTIUM SULPHIDE.

Strontium sulphate (C. P.)	22 parts.
Sulphur (C. P.)	1 part.
Gum tragacanth	q. s.

Proceed as before.

CALCIUM SULPHIDE.—(CANTON'S PHOSPHORUS.)

Calcine clean oyster shells to whiteness in a crucible, separate the clearer portions, reduce these to a fine powder, and place in layers with intermediate layers of flowers of sulphur in a crucible, cover, and heat to dull redness for about half an hour. Cover the crucible tightly and let it cool slowly in the crucible.

Another method of preparing this phosphorescent sulphide is to heat bisulphide of lime—obtained by boiling lime in a little water with twice its weight of sulphur—in a covered crucible at a low red heat for one hour.

CALCIUM AND ANTIMONY SULPHIDES.

Calcined oyster shells	3 parts.
Flowers of sulphur	10 "
Antimonic acid	1 part.

Mix intimately, in fine powder, and heat for half an hour in a covered crucible at low redness.

CHLORIDE OF CALCIUM.

Fuse chloride of calcium in a crucible and pour it out on a clean iron plate. As soon as it becomes cold enough break it into pieces and transfer to well stoppered bottles.

CALCIUM NITRATE.

Dissolve chalk or marble dust in nitric acid, evaporate to dryness, and fuse in a porcelain crucible.

These substances, when properly prepared and exposed to any strong light for a short time, exhibit phosphorescence for some time after removing to a dark place. A calcium sulphide has been prepared that, after a short exposure to sunlight, will continue to give out light for ten hours in the dark. When, by keeping in the dark, one of these substances has ceased to give out light, it may be made to give a series of fresh exhibitions by heating it first with the hand, then over a water bath, and finally on a hot stone plate.

A remarkable phosphorescence is developed in quinia and some of its salts by heat. Spread quinia or its sulphate on a sheet of paper, and spread the paper on a plate of hot metal in a dark room—a strong phosphorescent light develops at the edges and spreads to the center. A similar display is observed in sprinkling finely powdered fluorspar (calcium fluoride) over a plate of hot metal in the dark.

Boracic acid fused and allowed to cool breaks into small pieces, and along the cracks a phosphorescent light appears, which is sometimes strong enough to be visible even in daylight. Potassium sulphate fused with cream-of-tartar shows the same phenomenon.

PHOSPHORUS.

Phosphureted oil is the best means of exhibiting the luminous properties of phosphorus. A small piece of dry phosphorus, about the size of a pea, is placed in a test tube with a little pure olive oil. The test tube is held in the waterbath until the oil becomes heated and the phosphorus liquefies; it is then shaken until the oil will take up no more phosphorus, and, after allowing the oil to become clear, it is poured off into a small glass vial provided with a glass stopper. Only a small quantity of this oil in the bottom of the vial is necessary. When it is shaken about so as to coat the sides of the vessel, and the stopper is removed so as to let the air get in, the oil-coated sides of the glass become at once luminous, and continue so as long as the stopper remains out. Characters written on paper with oil thus prepared (freshly), appear in the dark very brightly.

Phosphureted ether is prepared by digesting phosphorus in ether for some days in a tightly stoppered bottle. A piece of sugar dipped into this ethereal solution and then thrown into water makes the surface of the latter appear quite luminous in the dark.

Young experimenters must remember that phosphorus is very dangerous to handle when out of water, and often inflames spontaneously when exposed dry in the air.

The Storage of Electric Energy.

Sir William Thomson, in a recent note to *Nature*, confirms the favorable results of his previous experiments with the Faure battery. He says: "I am continuing my experiments on the Faure accumulator with every-day increasing interest. I find M. Reynier's statement, that a Faure accumulator, weighing 75 kilogrammes (165 pounds), can store and give out again energy to the extent of an hour's work of one horse power (2,000,000 foot pounds), amply confirmed. I have not yet succeeded in making the complete measurements necessary to say exactly what proportion of the energy used in the charging is lost in the process of charging and discharging. If the processes are pushed on too fast there is necessarily a great loss of energy, just as there is in driving a small steam engine so fast that energy is wasted by 'wire drawing' of the steam through the steam pipes and ports. If the processes are carried on too slowly there is inevitably some loss through local action, the spongy lead becoming oxidized, and the peroxide losing some of its oxygen viciously, that is to say, without doing the proper proportion of electric work in the circuit. I have seen enough, however, to make me feel very confident that in any mode of working the accumulator not uselessly slow, the loss from local action will be very small. I think it most probable that at rates of working which would be perfectly convenient for the ordinary use of fixed accumulators in connection with electric lighting and electric transmission of power for driving machinery, large and small, the loss of energy in charging the accumulator and taking out the charge again for use will be less than 10 per cent of the whole that is spent in charging the accumulator; but to realize such dynamical economy as this prime cost in lead must not be stinted. I have quite ascertained that accumulators amounting in weight to three-quarters of a ton will suffice to work for six hours from one charge, doing work during the six hours at the uniform rate of one horse power, and with very high economy. I think it probable that the economy will be so high that as much as 90 per cent of the energy spent in the charge will be given out in the circuit external to the accumulator. When, as in the proposed application to driving tramcars, economy of weight is very important, much less perfect economy of energy must be looked for. Thus, though an eighth of a ton of accumulators would work very economically for six hours at one-sixth of a horse power, it would work much less economically for one hour at one horse power; but not so uneconomically as to be practically fatal to the proposed use. It seems indeed very probable that a tramcar arranged to take in, say, 7½ cwt. of freshly charged accumulators, on leaving headquarters for an hour's run, may be driven more economically by the electric energy operating through a dynamo-electric machine than by horses. The question of economy between accumulators carried in the tramcar, as in M. Faure's proposal, and electricity transmitted by an insulated conductor, as in the electric railway at present being tried at Berlin by the Messrs. Siemens, is one that can only be practically settled by experience. In circumstances in which the insulated conductor can be laid, Messrs. Siemens' plan will undoubtedly be the most economical, as it will save the carriage of the weight of the accumulators. But there are many cases in which the insulated conductor is impracticable, and in which M. Faure's plan may prove useful. Whether it be the electric railway or the lead-driven tramcar, there is one feature of peculiar scientific interest belonging to electro-dynamic propulsion of road carriages. Whatever work is done by gravity on the carriage going down hill will be laid up in store ready to assist afterward in drawing the carriage up the hill, provided electric accumulators be used, whether at a fixed driving station or in the carriage itself."

Electrotype of the Brain.

A brain, preserved and metallized by the galvanoplastic method, was lately presented to the French Academy of Medicine, on behalf of Dr. Oré, of Bordeaux. Dr. Oré's method (which preserves the brain entire) is briefly as follows: The brain having been so arranged that circumvolutions are well separate, by introducing cotton wicks into the fissures, and so that the preserving liquid may penetrate the ventricles, is kept about a month in alcohol at 90°, so as to acquire good consistency; the wicks are then taken out. The brain is now plunged for ten minutes in an alcoholic solution of nitrate of silver (100 gr. per liter of alcohol), and carefully drained in air. Next, it is transferred to a case in which sulphureted hydrogen is liberated, and it takes a dark hue owing to formation of a surface deposit of sulphide of silver. In about twenty minutes it is taken out, and after exposure a quarter of an hour in air, it is put in the galvanoplastic cell, where it soon assumes a fine metallic aspect.

A Boiler Water Safety Valve.

According to the *Revue Industrielle*, M. Barbe has successfully introduced a guard safety valve for steam boilers, to be brought into action only on emergencies. This valve is placed in a suitable position underneath the boiler shell, and is essentially an ordinary weighted lever safety valve turned upside down. When the valve is opened, therefore, water is blown off instead of steam. M. Barbe argues that, useful as ordinary safety valves undoubtedly are, there are occasions when a sudden and explosive evolution of steam takes place, and at such times these valves are of little service, since the steam cannot escape with speed equal to that at which it is formed, and the pressure consequently rises to the bursting point. In all such cases, in addition to what must be reckoned a possible failure of the ordinary valve for other reasons, M. Barbe's valve would be a complete safeguard, as it would instantly discharge a large quantity of water. It is known that a cubic inch of water increases in volume about 1,700 times when transformed into steam, and therefore the escape of the water would naturally be more efficacious in reducing the danger of explosion than the discharge of an equal bulk of steam. The idea, of course, is not new, but M. Barbe's apparatus for effecting the desired object is very simple and compact, although some objection might be urged against the awkward situation of the valve and the practical impossibility of examining it or keeping it in order during ordinary working; and all experience shows that fittings intended for use solely on emergencies are seldom in working condition when the event for which they are intended arrives. It is, however, stated that experiments have been made with the guard safety valve, under conditions similar to those of actual but dangerous working, and it has answered so well that many have been fixed in French factories.

Lemon Juice in Diphtheria.

Dr. J. R. Page, of Baltimore, in the New York *Medical Record*, May 7, 1881, invites the attention of the profession to the topical use of fresh lemon juice as a most efficient means for the removal of membrane from the throat, tonsils, etc., in diphtheria. In his hands (and he has heard several of his professional brethren say the same) it has proved by far the best agent he has yet tried for the purpose. He applies the juice of the lemon, by means of a camel's hair probang, to the affected parts, every two or three hours, and in eighteen cases on which he has used it the effect has been all he could wish.

Tartaric Acid in Diphtheria.

The topical use of tartaric acid in diphtheria has been successfully resorted to by M. Vidal, who, in one of the foreign medical journals, remarks upon the necessity of thus making use of topical agents against the false membrane, as it has a great tendency to spread by a sort of auto-inoculation, comparable to what occurs in certain cutaneous affections. His formula is ten parts, by weight, of tartaric acid, fifteen of glycerine, and twenty-five of mint water. The acid acts upon the false membrane, converting it into a gelatinous mass, and favors its expulsion.

The Lady Franklin Bay Expedition.

The Arctic expedition for meteorological and geographical exploration left St. Johns, Newfoundland, at noon, July 4, for the station selected for it near Lady Franklin Bay. The party will call at Disco or Upernavik, Greenland, for Esquimau hunters, dogs, clothing, etc., and then hurry on to the end of their journey. The steamer will at once return to Newfoundland. The expeditionary force is commanded by Lieut. A. W. Greely, Fifth Cavalry.

Varnish for Gelatine Negatives.

Collodion, by itself—even the ordinary porous collodion employed in negative work—answers admirably, says the *British Journal of Photography.* As a protection against damp its effect is simply marvelous; for, should the moisture penetrate it and reach the gelatine film, it possesses sufficient elasticity to withstand the strain put upon it. It exhibits little tendency to absorb silver from the damp printing paper, and in the event of actual moisture being accidentally present when in contact with the paper there is no fear of adhesion. For portraiture the film will bear working on with the pencil in retouching, though from its hardness and smooth surface it is usually desirable to use a "medium" to give a "tooth" which will take the pencil.

In preparing a special collodion for the purpose we should select a good, tough—not necessary "horny"—sample of pyroxyline, and use it of the strength of not more than four grains to the ounce, with two or three drops of castor oil. The best protective medium we have used consisted of a collodion made from celloidine, which gives a remarkably clear and structureless film, and may be used stronger than ordinary pyroxyline. Five grains of celloidine and two drops of castor oil to each ounce of solvents will answer well. There is a slight advantage in employing a small excess of ether over alcohol in dissolving—say nine parts of ether to seven of alcohol—both being as free from water as possible, and the negative very thoroughly dried before application.

ELECTRO-MASSAGE.

A large portion of electrical treatment that hitherto could only be carried out by specialists by using elaborate apparatus, by the proper use of a new mode of treatment, by employing the apparatus shown in the engraving, can be intrusted to the hands of those who are not so skilled.

By means of this simple machine the manipulator transfers the mechanical motion used in rubbing the patient into an electrical current, and the current as it is generated is transmitted through the part while being rubbed, and it fulfills the requirements of a treatment including rubbing, kneading, pounding, flexing, etc., combined with the application of the electric current.

The instrument consists of a metallic roller covered with chamois leather or other suitable material, an electro-magnet, and a permanent magnet set in a strong frame, which holds the instrument together. The roller, besides acting

DR. BUTLER'S ELECTRO-MASSAGE INSTRUMENT.

as the driving wheel of the machine, is so arranged that it also acts as one of the electrodes by which the current is transmitted, and is connected by gearing with the electro-magnet so as to cause the poles of the latter to revolve opposite those of the permanent magnet which forms the handle of the instrument. Each revolution of the roller produces twenty-five revolutions of the electro-magnet, which is magnetized and demagnetized at each revolution, and thus induces a current of electricity which is ample for all purposes for which it is intended. The circuit is completed by connecting any required electrode by the binding post at the side of the instrument, the roller acting as the other electrode; both are brought into contact with the surface of the body of the patient, and as the roller is moved about over the surface, the current is established and transmitted through the part over which the roller is made to revolve.

This machine includes in itself an electric generator, a rubber, kneader, a manipulator, and a set of electrodes, all in one. Any person of ordinary intelligence can be taught to use it under the direction of the attending physician. It is portable, being quite capable of being carried in an overcoat pocket.

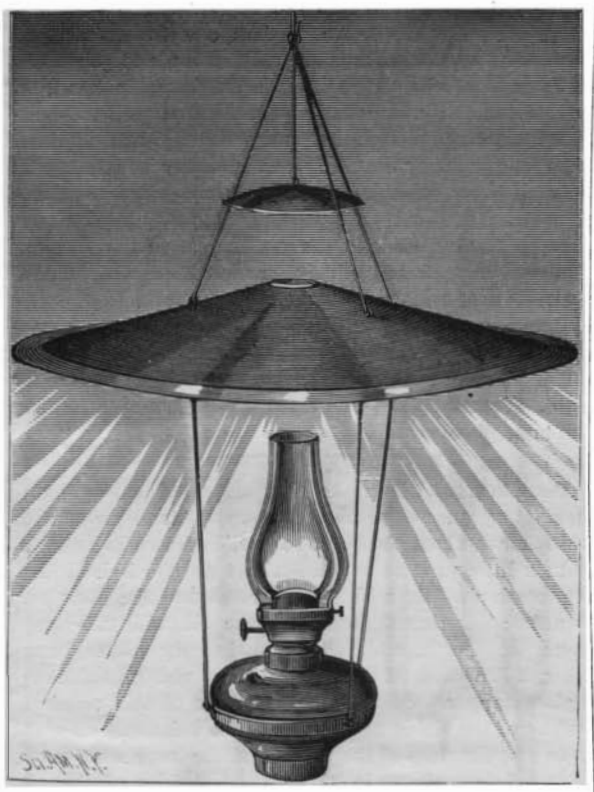
The inventor finds in practice that it has far exceeded his expectations, inasmuch as by its use he gets greater tonic effects than from the employment of both faradism and massage separately. It fulfills most of the requirements of the induction current in general practice and every-day cases. As the current is generated by motion, no acids or liquids of any kind are necessary. The instrument is at all times ready for use, a matter that will be appreciated by all who use electricity.

This treatment has been used with great success in cases of nervous exhaustion, debility, neuralgia, rheumatism, paralysis, etc., and we are informed that it is recommended by the medical profession generally.

This invention has recently been patented by Dr. John Butler, of New York city. Communications in regard to the instrument may be addressed to the New York Dynamo-Electric Manufacturing Company, 907 Broadway, New York city.

NEW REFLECTOR FOR SUSPENDED LAMP.

We give an engraving of an improved reflector for suspended lamps recently patented by Mr. John J. Smokey, of



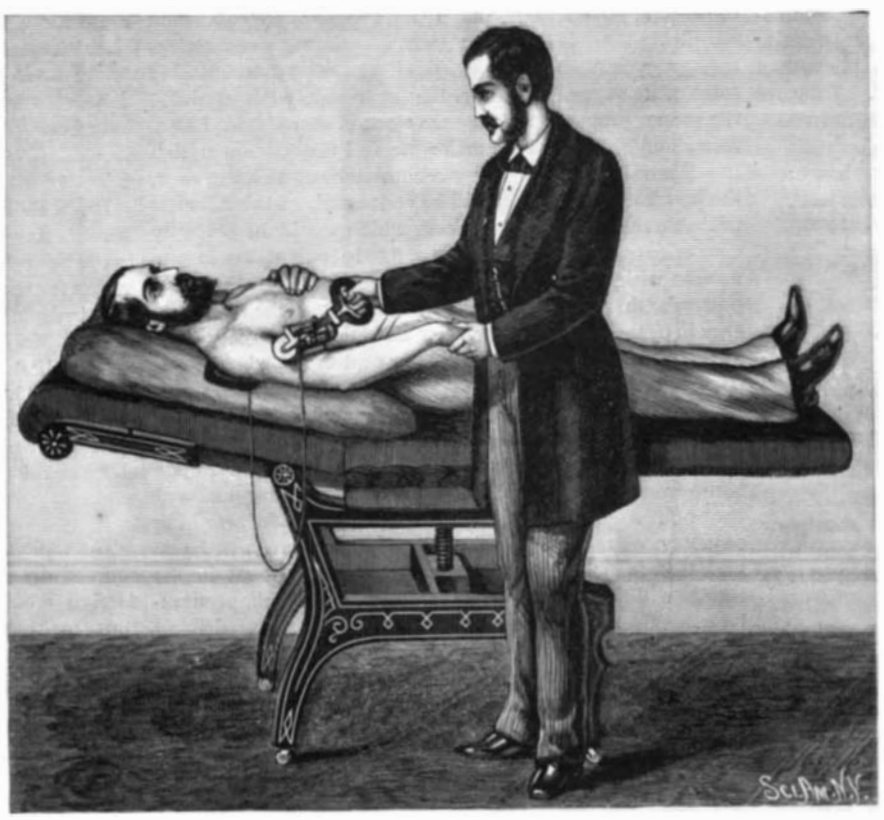
SMOKEY'S LAMP REFLECTOR.

Natchez, Miss. It is designed to increase the effectiveness of lamps by throwing down the greater portion of the light and preventing the shadow of the body of the lamp. The lamp is suspended by chains from a wire loop which also supports the reflector, and above it a small concave plate for receiving the heat that escapes through the opening in the center of the reflector.

The reflector is made in the form of a low cone from two to five feet in diameter according to the size of the room to be lighted, and is placed from nine to thirteen feet from the floor. It is made from tin, brass, or copper, and nickel plated to give it a bright and permanent reflecting surface. The device is inexpensive and adds greatly to the efficiency of the lamp.

The Bray of the Mexican Donkey.

The New Orleans *Democrat* recounts the many good qualities of the Mexican burro that has lately been introduced into that city as a child's horse, who, it seems, can banquet on splinters and scraps, carry immense loads, and is faithful, uncomplaining, docile, and tireless; but "we regret to say," continues the *Democrat*, "the burro brays. Amazing as is his strength, his stamina, his amiability, his courage, these things are as nothing compared to his bray. That such a tremendous and far-reaching sound should emanate from so small a source constitutes the eighth wonder of the world. When the little blue burro—they are nearly all blue—concludes to celebrate his scanty period of relaxation by a good, healthy, whole-souled bray—when he humps his little back, and shuts his appealing little eyes, and lets his ears lie along his back, and then gathers himself into one ecstatic note, it is enough to make one envy the sainted dead and long for the cold and silent grave. The sleepers for a mile around start up with the sweat of terror on their furrowed brows, children fall down in fits, the sick believe they have heard Gabriel's horn, and the very atmosphere shudders like a human creature. Burros don't often bray, because they haven't much time for braying; but they bray sometimes, and that is what keeps them so low in the scale of animated nature. Without his bray the burro would be little short of an angel. As he is, however, he is an animal to be admired at a distance and in the abstract."



PRACTICAL APPLICATION OF ELECTRO-MASSAGE.

Toughened Glass.

From the results of a large number of experiments it is found that the elasticity of toughened glass is more than double that of ordinary glass, and that toughened sheets bend much more readily than ordinary sheets. Single toughened glass has a resistance 2·5 times, and demi-double toughened glass a resistance 3·1 times that of ordinary double glass. Polished toughened sheets, of thickness varying from 0·006 meter to 0·013 meter, have a resistance 3·67 times as great as that of ordinary sheets of the same thickness, and the resistance of rough toughened sheets is 5·33 times that of ordinary rough sheets.—*De la Bastie.*

IMPROVEMENT IN BUTTONS.

The annexed engraving represents an improved button recently patented by Mr. Oscar Ericsson, of Sioux Falls, Dakota Ter., and designed for various uses, but more especially for men's garments. It is strong, quickly and conveniently attached, and is inexpensive.

The head of the button has a tubular shank, which rests on a concaved and serrated clamping disk, and is clamped in place by the elongated shank of a similar disk placed on the opposite side of the fabric. This shank, as will be noticed, enters the end of the tubular portion of the button, and is set down after the manner of an eyelet upon an inter-

ERICSSON'S IMPROVED BUTTON.

nal flange, holding all three of the members securely in place, and clamping tightly the cloth of which the garment is composed.

MISCELLANEOUS INVENTIONS.

Mr. William W. Batchelder, of New York city, has patented a novel article of manufacture which he calls a "continuous match," for the reason that the entire length or body of the match is made of the explosive compositions, which are so arranged as to flash at will without continuously burning.

The same inventor has heretofore patented devices for lighting the gas in which the lighting was effected by the union of two kinds of composition arranged in sticks side by side, which would not explode when separated in bulk, but when scraped up and mixed formed a pulverulent charge, which was exploded by friction.

The present invention comprises a novel and simplified device for carrying out this principle, which is designed to utilize a peculiar continuous match, which is constructed on the above-described principle. Mr. Batchelder has applied the same device to cigar lighters. He has also devised and patented a novel attachment to be applied to a gas-burner for the purpose of lighting the gas or to be used in any other connection desired.

Mr. Charles H. Starin, of Brooklyn, N. Y., has patented an improved ash-sifter, which consists in a box with an inclined top provided at the lower end with a hinged door, and at the upper end with a chute closed by a balanced gate, through which the ashes are dropped upon an inclined sieve or grating, down which they slide, the ashes dropping into a box below the sieve and the cinders accumulating in the lower end of the box.

An improved combined ruler and rotary blotter has been patented by Mr. Arthur R. Hall, of Prompton, Pa. This invention relates to that well known class of blotters which rotate in a case and are sometimes made with a paper cutter in front and a ruler strip on the rear of casing. It consists in making the case of a strip of sheet metal extend in the rear to form a handle, and made with a straight-edge in front supported on two side flanges.