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THE LEVITT-MULLER ELECTRIC LIGHTING SYSTEM AND MULTIPLE CIRCUIT DYNAMO.

The deep and unprecedented interest in electricity which everywhere prevails, has stimulated our electrical inventors to great activity, and while it may be true that there are many failures to reach beyond a certain already attained economy and excellence, yet, taken all in all, electrical science is advancing steadily and surely, and occasionally an inventor outstrips his competitors, and produces something better than that which previously existed. Mr. Hans J. Müller, a prolific electrical inventor of this city, seems to have been very successful in this respect, having devised a new dynamo-electric machine which is claimed to be independent of existing patents. He has also invented new forms of arc and incandescent lamps, all of which work very successfully, and in many respects appear to be marked improvements.

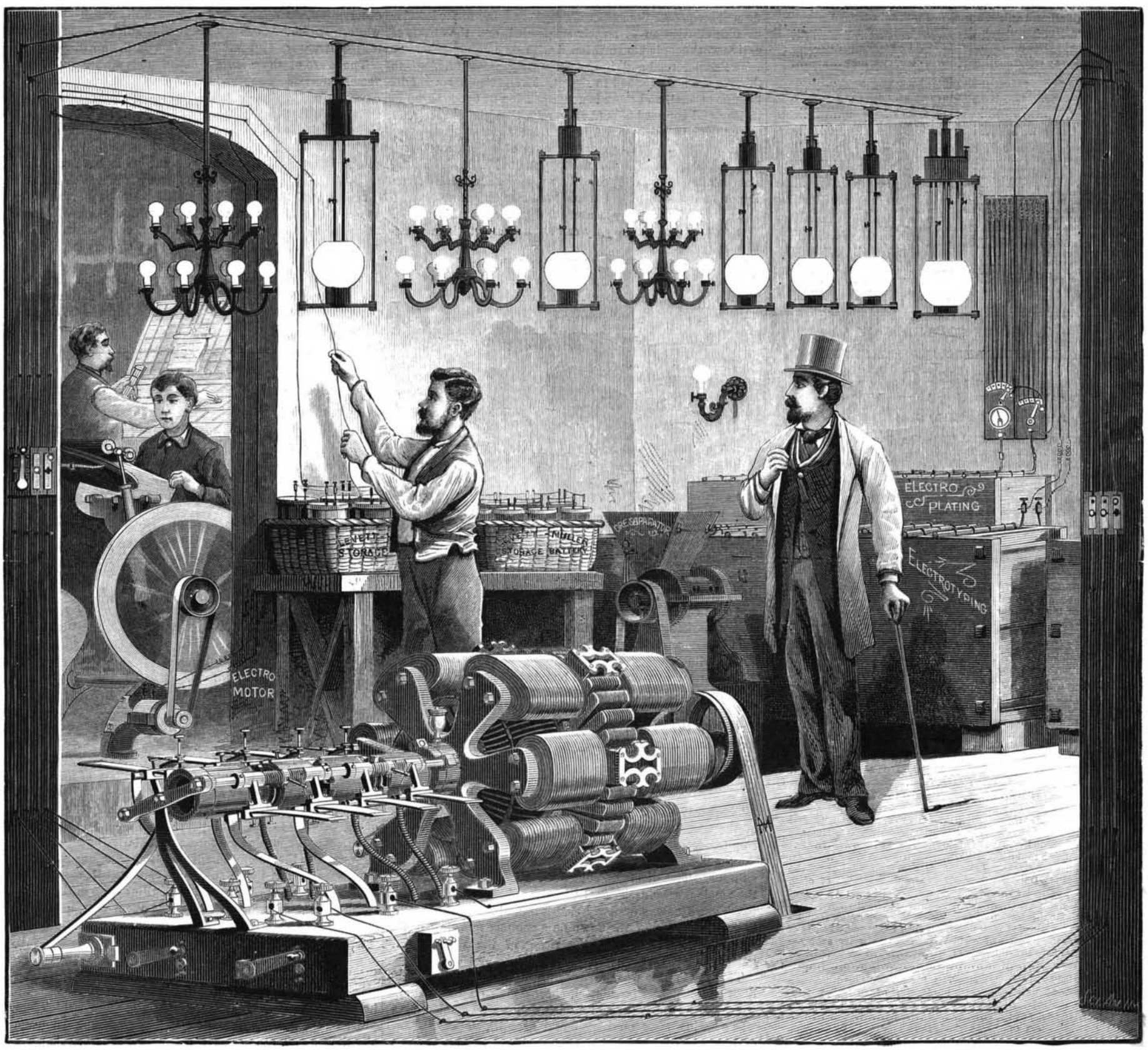
The new dynamo, which is shown in perspective in the foreground of our larger engraving, and in transverse section in one of the smaller engravings, is capable of yielding a number of separate and distinct currents which may be employed in widely different kinds of work. The dynamo shown in the illustration furnishes four separate circuits, with electric currents for as many different uses. One current is used for the arc light, another for incandescent lights, another for the transmission of power, another for electroplating. By simply duplicating some of the parts of the machine, the number of different circuits supplied may be indefinitely extended, and the currents may be used interchangeably for the arc lights, incandescent lights, electric motors, electroplating, storage of electricity, ore separating, and in fact for any of the purposes to which electricity is applied. The production of a number of separate and distinct currents in one machine is a novel feature claimed by Mr. Müller, and one that is of great utility. For example, by using one of these machines a hotel may have arc lights in the halls, offices, and in front, while its parlors and private rooms may be supplied with incandescent lights, and power may be furnished for its various operations of the kitchen and laundry. Similarly public and business buildings and private dwellings may be equipped, and steamers may be provided with arc lights for the decks and head lights, while the state rooms and cabins may be provided with the softer and mellower incandescent light.

This desirable result is secured by employing a series of armature coils or bobbins, A, in an armature wheel rotating between the poles of two powerful multi-polar field magnets, B, the several bobbins being divided into series, each series being connected with a series of commutator bars forming commutator cylinders, each being provided with a pair of collecting brushes, which deliver the current to the circuit upon which it is used.

To economize power the bobbins of the armature are arranged so that they are diagonal in relation to the poles of the field magnet. This plan allows the bobbins of the armatures to be removed from the vicinity poles of the field magnets with less force than would be required were the bobbins exactly radial.

The peculiar form of the armature wheel insures another important result—that is, the creation of a current of air throughout the machine which keeps all of the parts cool.

[*Continued on page* 114.]



THE LEVITT-MULLER ELECTRIC LIGHTING SYSTEM AND MULTIPLE CIRCUIT DYNAMO.

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(*Continued from first page.*)

The arrangement of the field magnets, armature bobbins, and connections is such that no bad effects are experienced from induction, the current in one circuit having absolutely no appreciable effect on that of another circuit.

This machine in ordinary working makes about seven or eight hundred revolutions a minute, and the lamps supplied by it seem to burn with absolute steadiness.

The arc lamp invented by Mr. Müller has a novel air check which regulates the movement of the upper carbon. This, in connection with other new devices, renders the light very steady indeed. We show in our engravings two forms of arc light, one burning a simple pair of carbons and limited as to the time it will burn continuously; the other form, which is shown partly in section in Fig. 2, is of the same general construction, but made in duplicate, so that it will burn two, three, four, or more pairs of carbons in succession.

In this lamp, when the light-arc is very small, there is very little resistance in the circuit, and the helix draws its core inward, raising the free end of the lever, A, as far as the upper screw will permit. This causes a pawl to engage with the ratchet-wheel of the feeding mechanism, which is rotated a short distance in the proper direction to raise the positive-carbon holder and lower the negative-carbon holder, thus separating the carbon points. This operation is repeated every time the carbons approach each other too much. The rapid descent of the carbons is prevented by the piston attached to the upper or positive-carbon holder. The weight of the upper carbon and its holder, acting on the ratchet-wheel and its shaft, raises the lower carbon holder. As the positive carbon is consumed twice as rapidly as the negative carbon, the wheel which it moves must have twice the diameter of the wheel which moves the negative carbon. As long as there are any carbons in the first lamp, the current passes into the positive-carbon holder, the positive and negative carbons, the helix, the joint piece of the armature, and from there to the generator. During this time the armature at the side of the helix is attracted by the pole piece at the lower end of the helix. As soon as the first set of carbons is consumed to such an extent as to interrupt the circuit, the side armature is released from the pole-piece and is pressed against a contact-strip which sends the current through the second set of carbons. As soon as the second set of carbons is consumed the armature of that lamp is released in the same way, sending the current to the third set and so on.

It will be seen that by this ingenious arrangement a battery of lamps may be kept in operation for a very long time, in fact the light may be made practically continuous.

Mr. Müller's incandescent lamp is shown partly in section in two views in Fig. 3. In this lamp the inventor secures the following important results: First, replacing the carbon filament without breaking or rendering useless any part of the lamp; second, preventing the entrance of air through the joints between the plug and the conductors passing through it to the carbon filament.

The glass globe or bulb is provided with a flaring strengthened neck, fitting very tightly on a beveled glass stopper or plug, which is secured airtight by means of packing material in a hollow base, D, adapted to be screwed on or otherwise attached to a bracket or chandelier arm. The glass plug

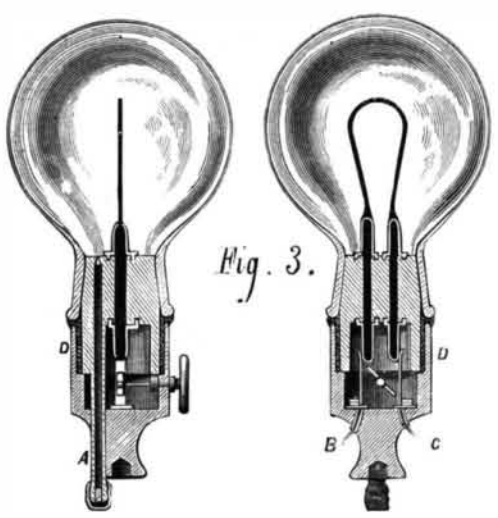


Fig. 3.—THE LEVITT-MULLER INCANDESCENT LAMP.

and the neck of the globe are ground together so as to fit air tight against each other. A packing is placed around the plug and the edge of the neck as shown. Two carbon conductors of suitable thickness are passed through longitudinal openings in the glass plug projecting from the top and bottom of the plug, and secured in the plug by a suitable cement forming airproof joints.

Copper rings are cast or blown into the top and bottom of the plug around the apertures through which the carbon conductors pass, and these rings project slightly from the ends of the plug. Copper is then precipitated by means of electricity around the projecting ends of the carbons and the rings. By this means the projecting ends of the carbons will be strengthened and prevented from being broken off, and the joint will be made airtight.

The upper ends of the carbons are provided with slots into which the ends of a carbon filament are passed and secured by means of a peculiar cement. A glass seal tube projects from the bottom of the plug through the base of the lamp, in which it is secured airtight by means of cement. The end of this tube extends through the plug, and is contracted at its upper end. This tube is stopped at both ends, and the intervening space is filled with mercury.

Two insulated spring-contact strips project upward from the bottom of the recess in the lamp base, and rest against the lower projecting ends of the carbons. These strips are connected with conducting wires, B C, leading to the electric

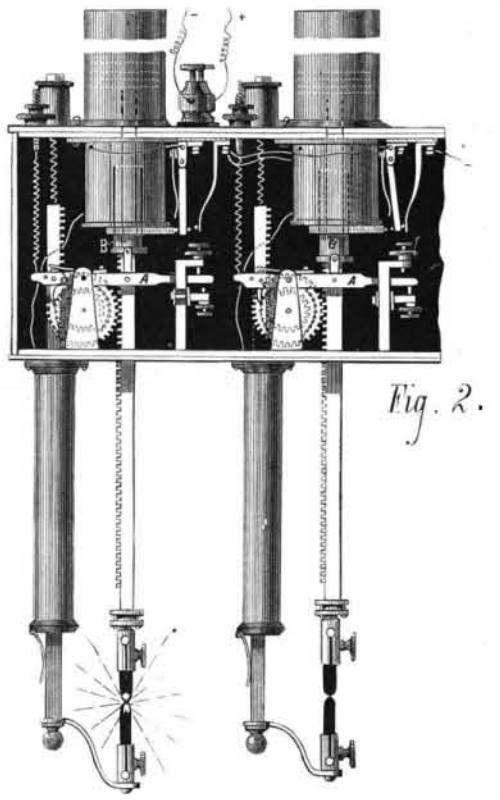


Fig. 2.—THE LEVITT-MULLER CONTINUOUS ARC LAMP.

generator. A key journaled in the lamp base has at its inner end a crosspiece, which is of sufficient length to separate the strips and remove them from the ends of the carbons when it is in a horizontal position. When this crosspiece is in a vertical position the strips are released and rest against the ends of the carbons.

Should the carbon filament be destroyed or broken the globe is removed, a new filament is inserted, the globe is replaced, and the air is exhausted.

In addition to these interesting inventions, Mr. Müller has devised a very successful magnetic ore separator, which is seen in the larger engraving beyond dynamo. He has also perfected a storage battery for which great advantages are claimed.

The headquarters of the Levitt-Müller Electric Light Company are at 540 to 546 West Sixteenth Street, New York city.

Reproduction of Written or Printed Matter.

As if the number of autographic presses and hectographs was not large enough to do all the copying required, new processes still continue to bail from Paris, the Yankeeland of Europe. This time it is J. J. Magne who has made an ink, or pencil, possessed of such qualities that a writing or drawing made with it, when dry, can be covered with a fatty ink, and the paper being saturated with a suitable liquid, it can be completely copied without being injured itself. Common printing ink acts toward this saturating fluid in precisely the same way as Magne's pencil, so that printed matter and cuts can be reproduced in exactly the same manner.

The liquid employed to saturate the paper consists of 150 parts by weight of acid (sulphuric is the best) and 350 parts of alcohol. If intended for autographic reproduction, 1,000 parts of water should be added. The proportions may be varied to suit the use that it is to be put to, but to prevent injury to the original, there must be plenty of alcohol.

Autographs for reproduction must be written with ink or pencil, of such composition that they can take up the fatty ink; the same kind is used for all kinds of paper whether sized or not. The portions of the paper not covered with ink are protected against the lithographic ink by an acid composition which repels the greasy ink, does not attack the cellulose, and, therefore, leaves the original perfectly unchanged.

The ink consists of proteine substances (albumen, caseine, fibrine, etc.), and of bichromated salts, alum, cyanides, etc. In making it there is dissolved a quantity of water two or three times as great as that of the albumen or other proteine substance, a mixture of two parts of a bichromate or alum, and one part of prussiate of potash. A certain quantity of albumen is also beaten up with an equal weight of water. The proportion of salts to that of albumen is about as six to one hundred. The two liquids are finely mixed intimately, and a suitable quantity of pigment added. The ink, which must have pretty deep color, is unchangeable, remains thin and fluid, and can be used with a pen, or pencil, or drawing pen, on any kind of paper, except that very heavy pasteboard or too thin silk paper cannot be used.

Pencils or crayons used in this process consist chiefly of paraffine colored with very fine lamp-black or ivory-black, or with any other very finely powdered pigment for other colors. When lamp-black is used the proper proportions are sixteen parts of lamp-black to one hundred parts of paraffine. To make pencils of different hardness the paraffine is melted and the color added, and then a certain quantity of ordinary rosin (colophony) is added, usually not over ten per cent. The mass is cast into candle moulds when in a semi-liquid state, and taken out when cold. These cylinders are then cut in pieces and wrapped in strong paper, or covered with wood like common lead pencils.

The method of taking a copy of what has been written or drawn is as follows: If the work was done in ink it is all ready to copy as soon as it is dry. If it is done in pencil the drawing must be steamed a few seconds by simply holding it over a vessel of boiling water. After being air-dried it is carefully floated, face upward, on the acidified alcoholic liquid. There it is left until thoroughly saturated, and then it is spread out on a sheet of glass or smooth board, and inked with an ordinary lithographic roller. All the letters and lines will be covered with the greasy ink. As soon as it is supposed that it is sufficiently inked it is carefully pressed with a damp sponge on those places that have taken the ink, and then washed with water. To remove the excess of moisture, it is spread out on a plate of plaster of Paris, and then transferred to a stone or zinc plate, and the copy taken. The precautions necessary in order to preserve the original copy are to wash it with carbonate of ammonia, or of soda, rinsing with cold water, removing the excess of water on a plate of gypsum or blotting paper, and then drying it in the press between sheets of porous paper.

To reproduce anything that is printed with printer's ink, the following method is pursued: The mixture of alcohol and acid is applied either to the face or back of the print with a brush. The liquid instantly penetrates the paper; the surface is then quickly washed off and the sheet carefully spread out on a dampened plate of glass or wood. There it is inked with an ordinary lithographic ink roller, gently washed to remove the excess of acid, dried on the gypsum plate, put on the stone and a sufficient pressure applied. The transfer of the negative is finished, and the ordinary lithographic process begins.

If both sides of a drawing or manuscript is to be copied, both sides are blackened, one after the other, the operation being carried out on one side as far as the transfer to a stone, and then the other side is inked and transferred. When copies of printed matter are to be made by this process, the negative is transferred to a polished zinc plate and then etched in the usual manner with acids.—*Deut. Industrie Zeit.*

Treatment of Scars of the Face.

A most important branch of cosmetic surgery is treated by Dr. C. L. Bull, of New York, in a reprint from the Transactions of the Ophthalmological Society. He says: "Persistent rubbing and kneading of scars of the face, both those due to burns and those resulting from bone caries, as

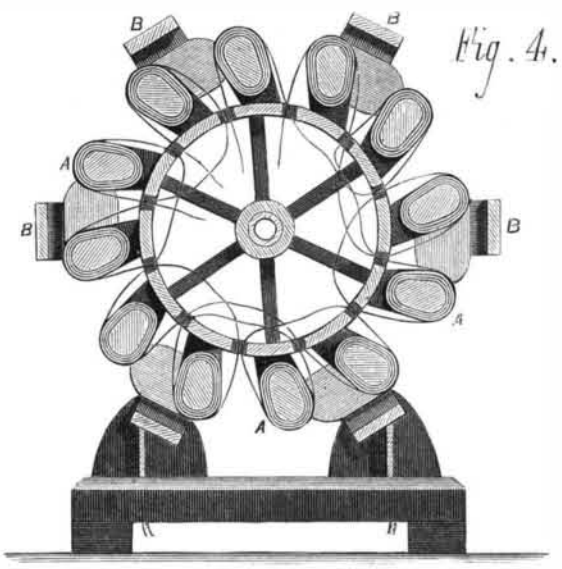


Fig 4.—TRANSVERSE SECTION OF THE LEVITT-MULLER DYNAMO.

preparatory to blepharoplasty, have, in a number of instances in the writer's experience, yielded most excellent results. Adhesions of scars, slight or extensive, to the subjacent parts, have been slowly, cautiously, and painlessly detached, and a gradual absorption of the firm material in the dense part of the scar has been brought about. So considerable has been the result obtained in some cases that the writer has come to regard this gradual extension and loosening as an important part of the treatment in these cases." When one reflects on the amount of mental misery these scars often cause, their removal becomes an object of great importance.

The London Fisheries Exhibition.

Congress having appropriated $50,000 for the collection, transportation, and display of objects representing the fishing interests of the United States at the International Fisheries Exhibition at London, next year, Commissioner Baird has issued a circular describing the character of the exhibits desired and the proper way of forwarding them.

Two classes of articles will be carried to London for exhibition, viz.: First, those which make up the "collective exhibit of the United States," and second, those which are entered for competition.

In the collective exhibit will be shown, in a systematic and synoptical manner, illustrations of our marine and fresh-water animals of economic value, together with the apparatus and methods of their capture and utilization, and the commercial, scientific, social, historical, and legislative aspect of the fisheries. It will include the most striking features of similar exhibits made by the Fish Commission in the Philadelphia Exhibition of 1876, and the International Fishery Exhibition at Berlin, in 1880, together with many additional ones never previously attempted. The major part of this display will be borrowed from the collections of the National Museum in Washington, but it will be necessary to secure a considerable number of new objects.

It is considered especially desirable that the department of competitive exhibits shall contain a very complete representation of the various food preparations of fish—canned, dried, pickled, smoked, etc.—there being a constantly increasing demand in England for goods of this description, shipments to that country amounting, in 1881, to more than $2,000,000, in addition to the very large exports to other parts of Europe and to the European colonies in the East. Manufacturers of boats and boat-fittings, angling apparatus and costumes, and other similar articles, are also urged to contribute. Medals in gold, silver, bronze, and diplomas of honor will be awarded by a jury of experts. Professor Baird is prepared to act, both in this country and in London, as the representative of individual exhibitors, and to attend to correspondence relating to applications for space, etc.

Goods to be exhibited, if delivered in Washington, Philadelphia, or New-York, will be carried to London and installed at the expense of the Government; special arrangements may be made for the return of articles at the close of the exhibition. Prospectuses, blank application forms, blank "lists of exhibits proposed to be shown," and any information desired will be furnished on application to the Commission at Washington Applications for space for competitive displays should be made before the 1st of September, 1882. The exhibition—which is under the patronage of the Queen of England and the Presidency of the Prince of Wales—will be opened on the 1st of May, 1883, in buildings now being erected in the Horticultural Gardens at South Kensington, and will continue for a period of six months.

NOVEL DOOR SECURER.

We give an engraving of a very compact and convenient device for securing doors. It is designed principally for the use of travelers, and is very readily carried, and quickly

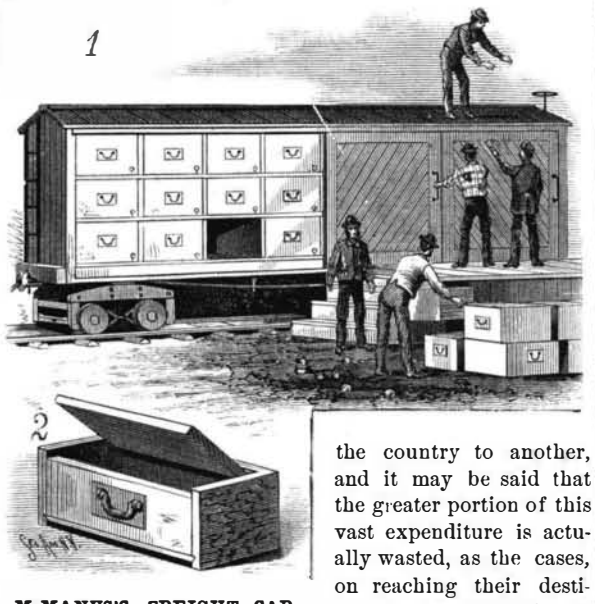
PORTABLE DOOR SECURER.

and easily applied to the door, and when so applied renders the door perfectly secure. The fastener is nicely finished and nickeled, and weighs complete only one and one-half ounces. It is provided with a morocco case, in which it is placed when not in use. A metal strip is provided at one end, with a flat hook, and a screw threaded rod is pivoted to its opposite end. A U-shaped piece, whose shanks are of unequal length, is apertured to receive the threaded rod, and the ends of the shanks of the U-shaped piece project toward the hooked end of the strip. This piece is secured in any desired position on the rod by a milled nut screwed on the outer end. The ends of the U-shaped piece have a flat, smooth surface to rest against the surface of the door and frame. The shorter shank is adapted to rest against a moulding or casing, and is provided with a swinging leg of such length that when it is swung outward its end will be flush with the end of the long shank. When in use, the hook of the metal strip is placed against the jam of the door, and the U-shaped piece is turned in such a manner as to permit the closing of the door, and by closing the door the hook is forced into the wood of the jam. The U-shaped piece is then turned so that the long shank will rest against the surface of the door. The device does not mar the door, and keeps it perfectly locked, and is applicable to doors of any thickness, having any style of casing.

This invention has been patented by Mr. Charles A. Crongeyer, of Detroit, Mich. Further information may be obtained by addressing Messrs. Crongeyer & Busch, Lock Box 643, Detroit, Mich.

IMPROVED FREIGHT CAR.

Hundreds of thousands of dollars are annually expended for packing cases in which to ship goods from one part of



McMANUS'S FREIGHT CAR.

the country to another, and it may be said that the greater portion of this vast expenditure is actually wasted, as the cases, on reaching their destination, are found, in many instances, to be worse than useless, and are consequently destroyed. This, together with the fact of the injury to certain classes of goods, in the ordinary methods of handling and shipping, and the trouble and expense of packing and unpacking goods in the ordinary way, has led to the invention shown in our engraving.

The cut shows a freight-car divided horizontally by two platforms or partitions, forming three longitudinal compartments, which are subdivided by vertical partitions forming small chambers for receiving a series of packing cases of uniform size and shape. The sides of the car consist of sliding doors, which may be moved so as to expose either half of the car, or, in fact, any portion of it.

The packing boxes are of sufficient thickness to properly protect the merchandise packed in them, and are of such size as to be conveniently handled. They are provided with handles on opposite sides, and have hinged covers by which all the trouble of nailing and removing nailed covers is avoided.

The cases can be furnished to merchants, who can fill them with goods and deliver them at the freight stations. The receiver of the goods can unlock the cases and remove the goods, and the cases, at a slight expense and without injury, may be returned to the shipping point. All of the cars are to be provided with compartments of uniform size, and any case will fit any car.

As the compartments extend entirely through the car, the load may be readily taken from either side of the car; the arrangement also permits of double length boxes for special classes of merchandise. Of course a car may be fitted with the compartments and cases in one half, only leaving the other half as a plain box-car.

Fig. 1 shows the car as it appears while being loaded or unloaded, and Fig. 2 shows the packing case in detail.

This invention has been patented by Mr. Edwin McManus, of Randolph, N. Y.

Theory and Practice.

Theory and practice, says the *Chemiker Zeitung*, will involuntarily strike the ear of some of our readers like shrill discord.

"All theory, dear friend, is hoary," perhaps one will say, while the theorist, wrapping his toga proudly about him, will draw aside from the practician with a sympathetic smile and express *his* ideas. The contradiction herein expressed has become so customary that one rarely meets with any other conception than this which is decidedly false. For this reason we may be permitted to state in a few words what is the real relation between theory and practice.

We do not see in it any contradiction, any "master and servants," or "head and hand;" nay, we look on them as two perfectly equal factors, through the harmonious co-operation of which the acquisitions of science are first made to serve mankind. If we admire the learned who live only for science, pondering on the highest problems for their own sake alone, unconcerned as to whether their thoughts can find any practical use, we do not honor less the man who is quick to see which thoughts of that savant promises a rich return if carried into practice, and then with an iron energy carries it out, and impresses upon it its best form.

And where is there any discovery which owes its origin to the mind of a theorist, that has not found its first complete application in the efforts of a diligent practician?

We have seen a whole series of discoveries, which seemed originally to have merely a scientific value, but they soon celebrated unexpected practical triumphs; we have seen how flourishing industries have been built on small and unseemly experiments made only for scientific purposes in the laboratory of the investigator, not only without regard to their practical utility, but very frequently without any suspicion of it. About two decades ago Bunsen and Kirchhoff astonished the world by their discovery of spectrum analysis, but at that time no one imagined that it would so soon find an eminently practical and genial use in the manufacture of Bessemer steel.

The insignificant observation that the legs of a frog hanging on a copper wire would jerk whenever they touched the iron, was the foundation of the electric telegraph, and there is scarcely another domain in which practical men have attained such brilliant results as in electricity.

Marggraf's ever memorable isolation of the "sweet salt" in the beet was the corner stone of one of the most flourishing industries of Germany, which to-day supports very many chemists and technical men who are continually striving to advance the higher development of this branch of industry.

What a wide step from Zinin's conversion of nitro compounds into amides to the present state of the coal tar color industry!

We could give an enormous number of examples of how small theoretical beginnings have risen to important practical results. But these few may suffice to show how everything of importance which has been accomplished in our profession owes its results to the circumstance that theory and practice have mutually supplied each other's deficiencies.

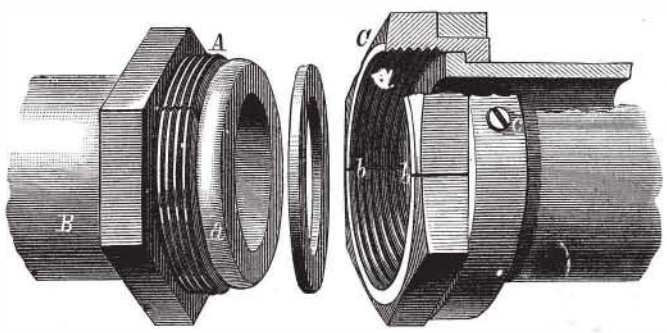
FREY'S PLUMBER'S COUPLING.

The great difficulty with plumbers' couplings used in connection with bowls and tubular connections of porcelain, glass, or other brittle material, is that they are difficult to apply, and can be applied and removed only with the risk of breaking the bowl or connection.

A ring or sleeve, A, having an external thread and divided into two or more longitudinal sections, is put on or around the branch, B, of the bowl. This ring is made somewhat larger in diameter than the collar of the bowl, and to receive a nut which holds the sleeve together and in place. The screw collar, C, of the coupling fits over the collar of the bowl, and screws on the split sleeve, A, bringing the flanged end of the pipe against the rubber packing ring by which the joint is made tight.

The split sleeve is prevented from turning when the joint is made by means of a tool fitted to the slits between the halves of the sleeve, or by means of a rubber band slipped over the collar, *a*, of the bowl.

In some cases it may be desirable to place the collar, C, on the branch, B. This collar is then split as shown at *b*, and



NEW PLUMBER'S COUPLING.

the two halves are held together by a ring, *c*, which slips over the smaller diameter of the collar, and is secured in place by two screws. In cases where two flanged pipes, or connections of porcelain glass, or even iron or other material, require unity with a strong tight joint, and when it is impossible or inconvenient to apply the ordinary coupling, both the sleeve, A, and collar, C may be divided as described. In this case also the two parts may be readily separated by taking the ring *c*, from the divided collar, C.

It will be seen that this device admits of applying a positive and reliable coupling where cement joints have heretofore been used, and it will prevent the breakage of many expensive pieces of work in plumbing.

Further information in regard to this useful invention may be obtained by addressing the inventor, Mr. J. J. B. Frey, 1283 Broadway, New York city.

The Telephone at Alexandria.

It appears that just before the bombardment of Alexandria arrangements had been completed for the introduction of the telephone in that city. The work had been done by Mr. H. H. Eldred, formerly station agent at Passaic City, N. J., who was at Malta during the bombardment, and conducted the experiments by which the firing was heard through 1,000 miles of ocean cable. The experiments were suddenly terminated by the explosion of a shell from one of the 81 ton guns in the cellar of the Alexandria central office.