SCIENTIFIC AMERICAN

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A WEEKLY JOURNAL OF PRACTICAL INFORMATION, ART, SCIENCE, MECHANICS, CHEMISTRY, AND MANUFACTURES.

Vol. LX.—No. 13. ESTABLISHED 1845. NEW YORK, MARCH 30, 1889. $3.00 A YEAR. WEEKLY.

THE METROPOLITAN TELEPHONE CO.'S NEW CENTRAL STATION AND GREAT SWITCHBOARD.

The Metropolitan Telephone Company, of New York, have recently erected a new central station building in Cortlandt Street, which is of special interest as embodying the latest improvements in telephone central station work and accessories, as well as containing the largest switchboard in the world. At present about 2,500 subscribers use it, but all the connections are prepared for 6,000, and the board can be extended so as to include 10,000. The building is fireproof throughout.

The cellar is excavated under the sidewalk and roadway of the street. In its front end are the terminals of several subway conduits partially occupied by cables. At present forty-nine lead-incased cables enter the building (Fig. 1). Each cable contains about one hundred wires, arranged in pairs, the wires of each pair being twisted about each other.

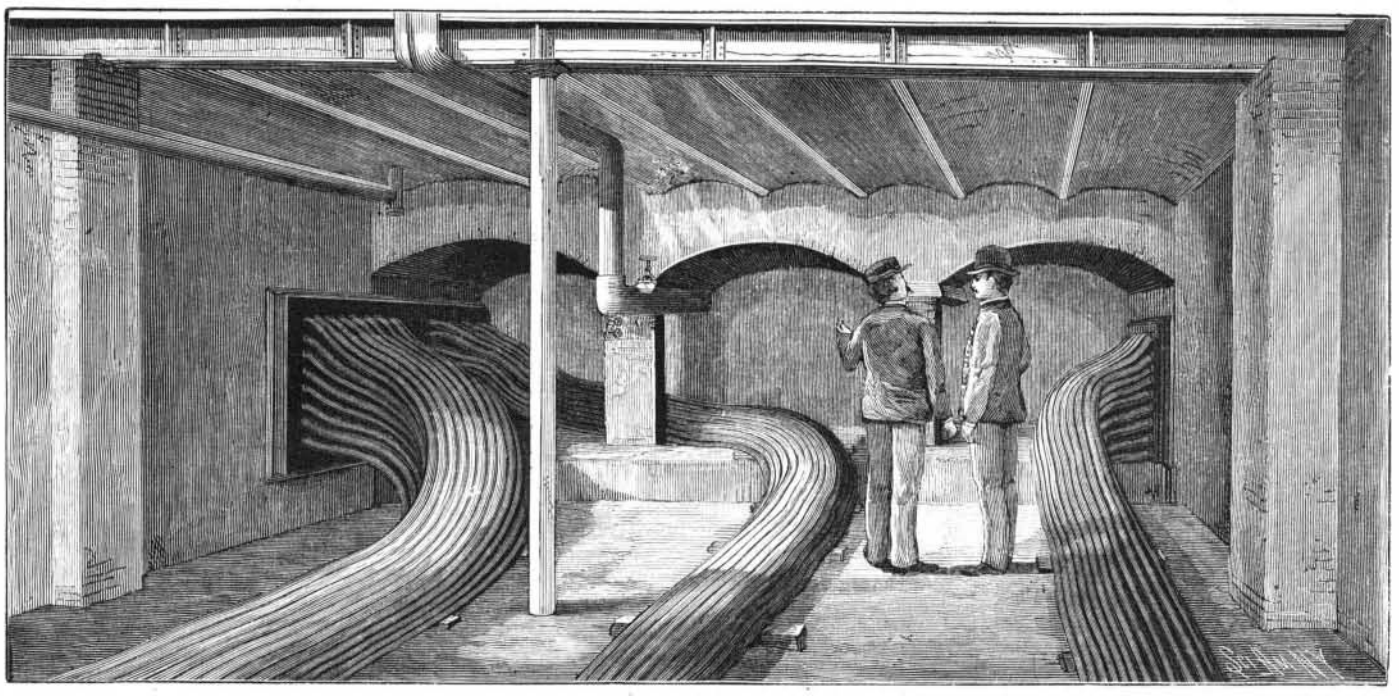

Fig. 1.—CELLAR, SHOWING TERMINALS OF SUBWAYS AND ENTRANCE OF TELEPHONE CABLES.

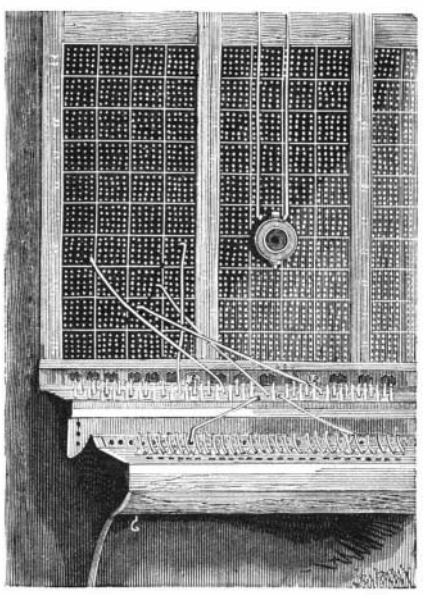

Fig. 2.—ARRANGEMENT OF SPRING JACKS, SWITCHES, AND ANNUNCIATORS ON SWITCHBOARD.

The object of this disposition is to ultimately use the wires in complete metallic circuits, the twisting of each pair being for the purpose of reducing induction. At present ground circuits are generally used, so that nearly one-half of the wires in these subways are idle. The cables run thence to the testing room (Fig. 7). The wires from the street lines are connected to binding screws. House cables run up from this room to the top of the building, where the switchboard is placed. The ends of the street cables are opened, and the pairs of wires are kept separate, and, by testing with a bell and battery, are traced to their out-door terminals. Each pair is numbered, and connected through the box with corresponding binding screws. The same operation is performed in the build-

(*Continued on page* 199.)

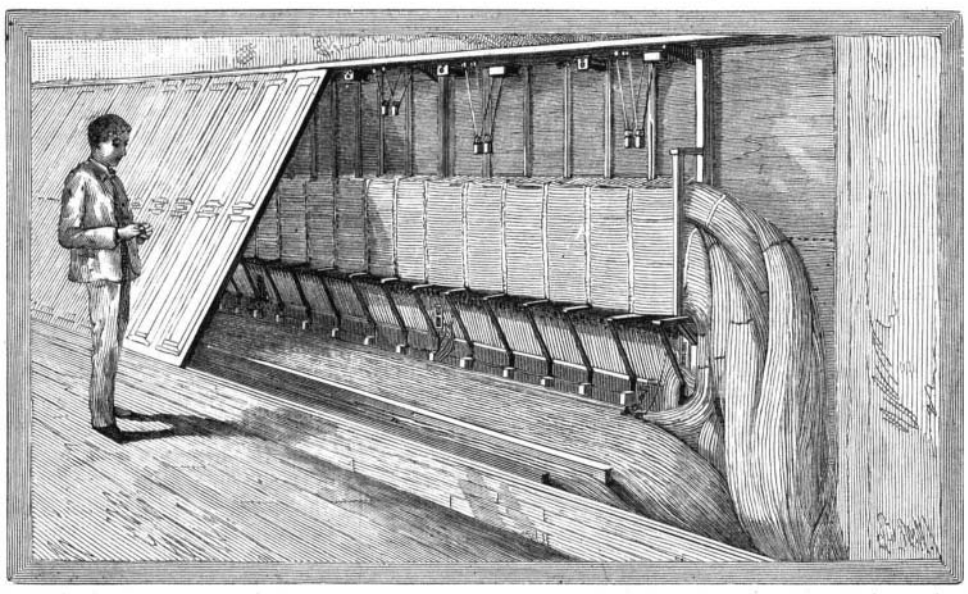

Fig. 3.—REAR VIEW OF SWITCHBOARD, SHOWING CABLES.

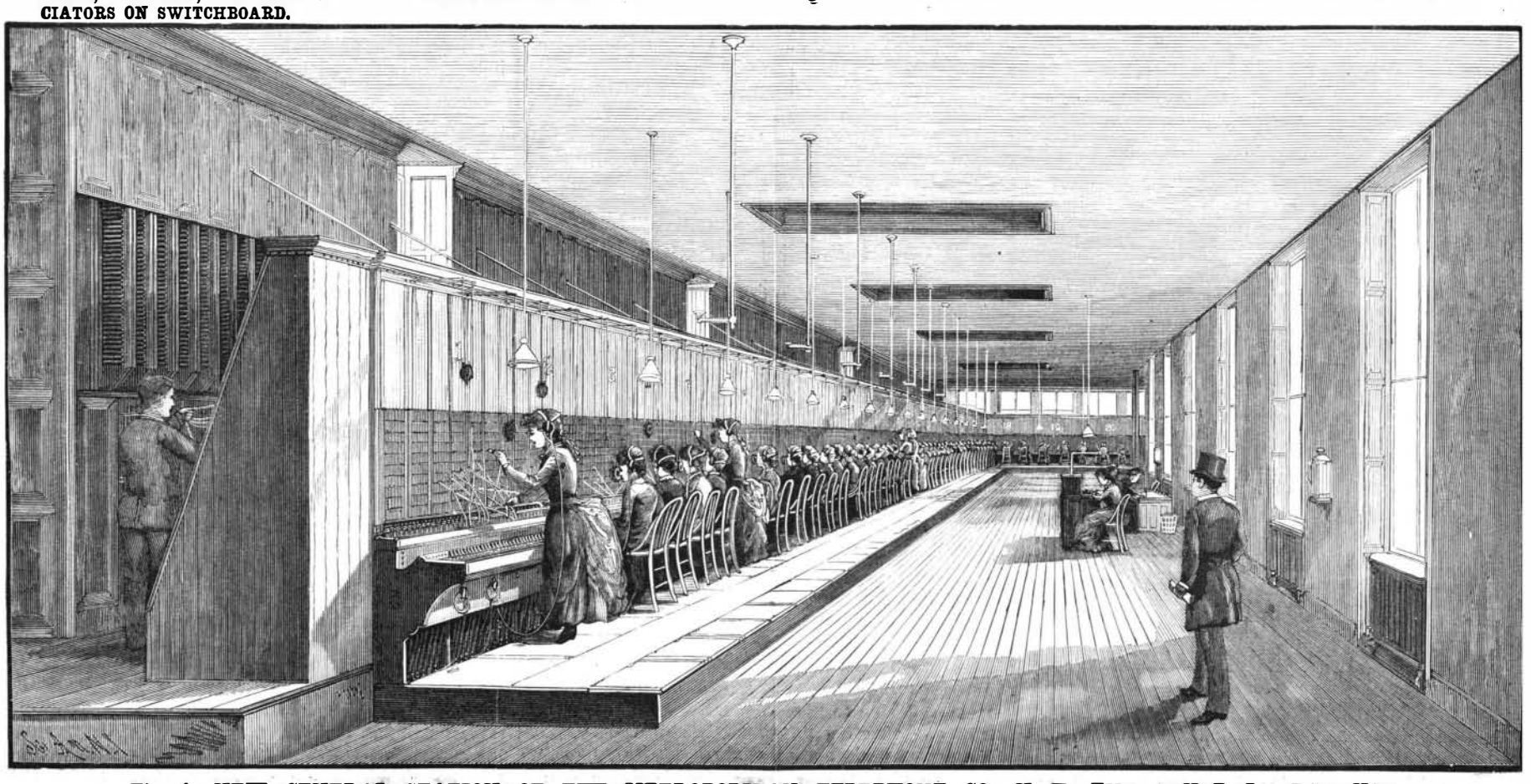

Fig. 4.—NEW CENTRAL STATION OF THE METROPOLITAN TELEPHONE CO., N. Y.—THE GENERAL EXCHANGE.

THE METROPOLITAN TELEPHONE CO.'S NEW CENTRAL STATION AND GREAT SWITCHBOARD.

(*Continued from first page.*)

ing for the house cables leading upward, and by the connection boxes all is placed in correct circuit. The wires are all India-rubber coated.

Entering the switchboard room, they are distributed on the cross connecting board along the walls, thence communicating with the mass of wires that run along the back of the switchboard proper. The board stands about eight feet in height upon a slightly elevated platform. Its total length is 258 feet, and it is divided into forty-three sections, each six feet long. The general view of the switchboard (Fig. 4) shows about a third of its length.

Silk-covered wires, cotton wrapped, are used for the board, disposed in cables or bunches, each containing forty-five wires, representing a total of 3000 miles. A view is given (Fig. 3) of the rear of the switchboard showing the groups of cables and also the induction coil boxes and counterpoise weights of the operators' transmitters.

The switchboard, which was erected by the Western Electric Mfg. Co., of this city and Chicago, is of the multiple type. It is presumption to set a limit to invention, but the multiple switchboard seems to have nearly reached perfection. At a recent telephone convention in this country it was described as the nearest approach to a perfect system. Its extensive adoption in this and other countries certainly speaks well for its merits. The connections are so arranged that any operator without leaving her place can connect with any subscriber. The converse is not the case. Only a limited number of subscribers can communicate with a given operator. Thus, as the board is now being worked, each operator can be called up by fifty to seventy-five subscribers. But without leaving her place the one operator can put any one of these in communication with any of the 2,500 subscribers now on the board.

Although only this number are now connected, the board is wired for 6,000, with capacity of extension to 10,000 subscribers. It is divided into 43 sections, each section in six divisions. To each division 1,000 subscribers are connected, in groups of 100. Thus each section has connected with it 6,000 subscribers' wires. For each wire a little hole in the front of the board is seen, and back of this is what is called a spring jack. This originally consisted of a pillar about 1½ inches long and as thick as a lead pencil; a simpler mechanical construction has now been adopted. It carries an insulated stud against which an insulated spring presses. In each section there is one spring jack, and there are altogether on the upper face of the board 43 for each subscriber distributed all around the room. Each 6,000 connections are contained within 6 feet of length of board, and this is repeated 43 times. *These connections are for subscribers who are to be called up only.* But the same number have to be provided for in the role of callers. All along the front of the board for its entire length, and near the edge of the projecting shelf or keyboard, is a single row of 6,000 holes beneath which are corresponding spring jacks. This row is 258 feet long; 150 of the spring jacks occupy the lineal space of one section. Back of these holes are annunciators, or drop shutters, one for each connection. The subscribers connect through the annunciator with these spring jacks. For 50 to 75 of these "calling-up" connections there is one operator. Arranged in rows parallel with the front of the board there are a number of connecting plugs attached to flexible conductors. For each pair of plugs and cords there are two buttons and an annunciator, or drop shutter. A microphone hangs in front of each operator, and a receiver is held by a spring support against the ear. A hand switch for each calling subscriber is also contained upon the keyboard (Fig. 2). The general operation of making a connection is as follows:

The calling subscriber rings his bell. This produces no corresponding sound in the exchange. It merely causes a shutter to drop, disclosing his number to one of the operators. She at once closes the shutter, inserts a plug in the caller's spring jack, and pulls down the cam lever switch, thus bringing her telephone into shunt circuit with the caller's line, and asks, "What number?" The caller responds, giving, it may be, any of the 6,000, assuming the entire board to be in operation. The other plug of the pair is inserted in the proper spring jack in the upper face of the board, if the subscriber's line is not "busy;" the cam key is thrown up, and one of the buttons is depressed. This rings the bell of the subscriber who is asked for, and the two are now in communication. When through, the subscribers ring their bells. This operates the annunciator belonging to the pair of cords and plugs that is in use for their connection. At one time it may be one pair, and a second time it may be a different pair that is used. The annunciator shutter is seen to drop, the plugs are pulled out, the shutter closed, and all again is in *statu quo*. Before making the connection with the subscriber called for, the operator touches the spring jack frame with the plug. If a click is produced in the operator's telephone, it means that the subscriber is already in connection, or is "busy." If no sound is heard, the line is free.

This use of independent plugs and cords is a recent improvement. For a section of 150 calling-up spring jacks there were formerly 150 pairs of plugs and cords. Now there are only 48, and any pair that is free can be used. For each pair of cords there are a pair of buttons, one for the calling subscriber's bell, the other for the answering subscriber's bell, a cam lever listening key that enables the operator to answer the subscribers, and finally a clearing-out annunciator. In practical work, the operators can be arranged as closely as desired around the board, provided a transmitter and receiver is furnished for each. Thus an operator may be subject to fifty callers or less. But she must be prepared to put this fifty into connection with any of the 6,000 or more on the board.

The wire of a single subscriber may now be traced. It enters the cellar of the building and is carried up to the switchboard and all along its back for its entire length. At each section it is cut, and the ends are connected to its own upper division spring jack, one to the spring and the other to the stud. This is repeated forty-three times. These give the connections for being "called up." Besides these, one connection is made with the proper answering spring jack on the lower row, and thence through the annunciator to earth. Leaving out of consideration the induction coils as unnecessary to the comprehension of the board, the other end of the line may be regarded as grounded at the subscriber's end. Thus the circuit includes the general outdoor and indoor lines, and a line the length of the switchboard with the forty-three upper spring jacks, a single lower spring jack, and a "calling-up" annunciator, also in circuit and eventually grounded.

This circuit is insulated from the frames or front collars of the spring jacks. With these frames, that are nearly flush with the front of the board, a second wire is connected, that for each subscriber simply runs from spring jack to spring jack, for the forty-three main connections all around the switchboard. When a spring jack is plugged, the spring is forced away from the stud so as to break the circuit, and is brought into connection with the plug, and through it and its flexible connecting wire with the other plug and second subscriber, and thus with the ground. But the plugs also connect with the frames of the spring jacks, so that the forty-three frames are all in circuit. The second wire comes here into use. If one of the forty-three spring jacks is plugged, then, the frames of all being connected, if an operator touches any of them with a plug, the click heard in her telephone pronounces the line busy. Unless one of the spring jacks is plugged, there will be no click. This wire, called the testing wire, performs no other function whatever. But it is possible that the entire system may be placed on metallic circuit. Then this second wire will be utilized as a metallic return. At present there are about fifty metallic circuits in use on the board. The connections in front of the board, showing the back and front plugs and flexible connections and counterweights, are shown in the diagram (Fig. 6).

In Fig. 4, a general view of the front of the board is given; in Fig. 2, the arrangement of spring jack apertures in groups of 100 is shown. It is evident that the operator can very quickly find any desired number of the 6,000. The upper part of the board is unoccupied. When this portion is filled, the capacity of the board will be nearly doubled. It now, as has been stated, is wired for 6,000 subscribers.

The subscriber's bell is rung by depressing a button. This turns on a current from a dynamo driven by an electric motor. At night a current is taken directly from the storage batteries, and by means of a pole changer is made to vary in direction so as to ring any bell it is connected with.

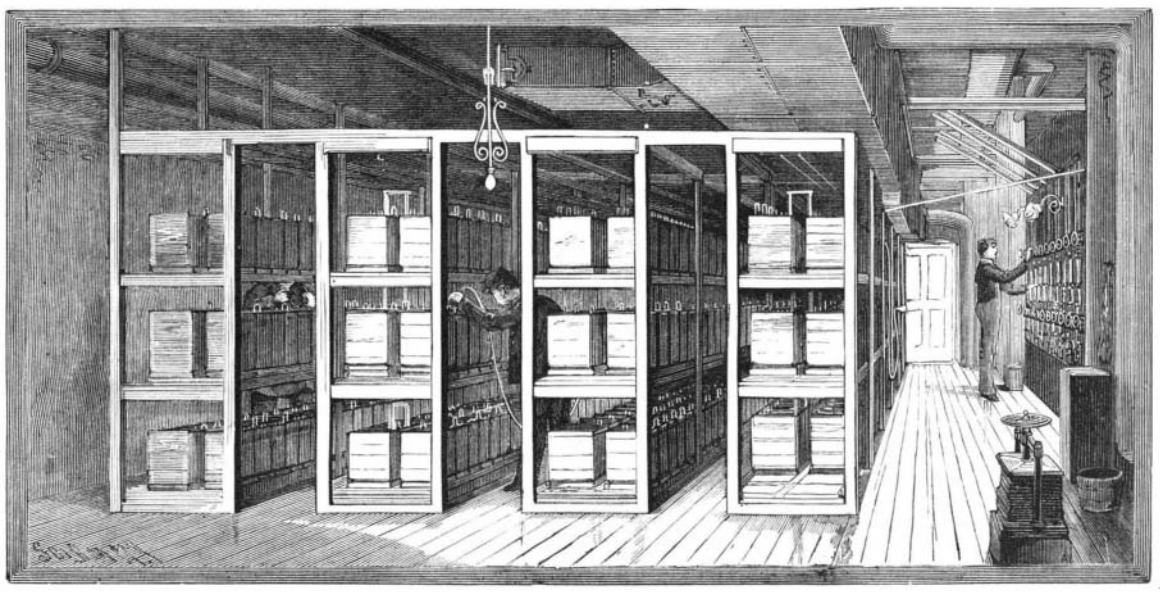

Fig. 5.—STORAGE BATTERY PLANT, SWITCHES, AMPERE METERS AND SWITCHES.

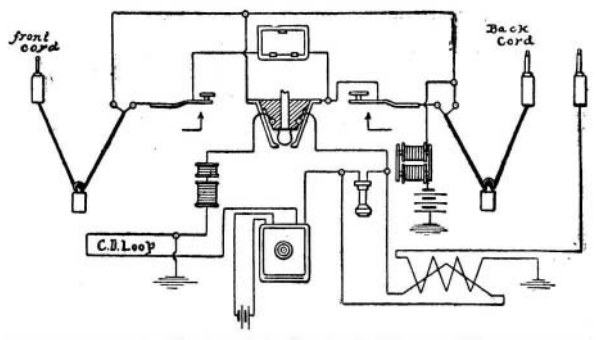

Fig. 6.—KEYBOARD CONNECTIONS.

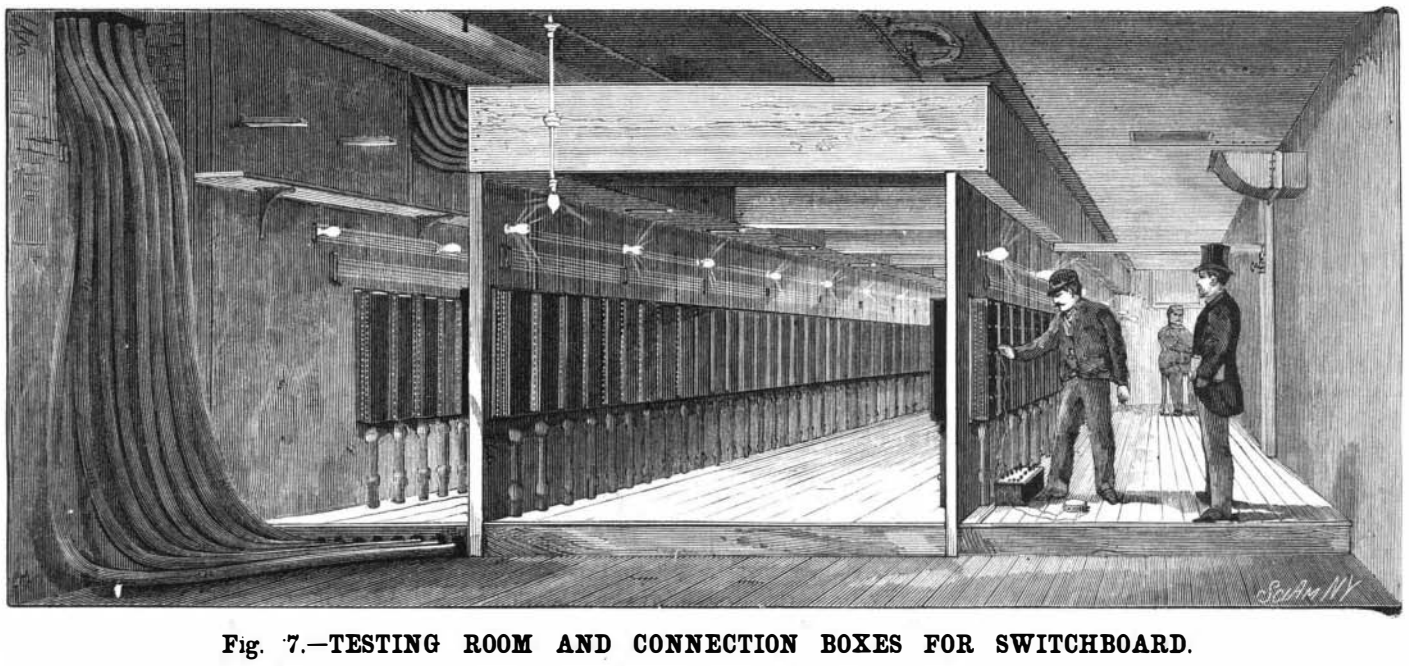

Fig. 7.—TESTING ROOM AND CONNECTION BOXES FOR SWITCHBOARD.

Some idea of the magnitude of the work may be reached from the number of soldered connections. Of these there are 810,000 back of the board. After it was erected and in place, over a year was consumed in making these joints and connecting the wires with the switchboard.

In Fig. 3 a view is given of the rear of the board, showing the general arrangement of cables. The division into sections can here be traced, one section and part of another occupying the foreground of the cut. At the top the induction coils are seen, which form part of the operator's talking and listening apparatus. Hanging from pulleys the counterweights can be seen which support the weight of the swinging transmitting microphones.

On the floor of the room are three desks with spring jack connections, telephones, etc. At each of these sits a monitor, who can connect at will with any of the operators or with her group of subscribers, so as to hear all communications between operators and subscribers. Thus he watches their work, receives from them any notices of faults, and can be asked by the operators for information. The three monitors can also communicate with each other.

Lightning arresters are placed in each circuit back of the board. They are seen in Fig. 4 on the left hand side, arranged in rows against the wall. They consist of a thin strip of easily fusible metal held within a protecting tube. This foil will be melted by the lightning before it can do any injury. Very few are thus destroyed, and they can be instantly replaced by new ones.

Starting with front of the keyboard, the following is the succession of keys, etc. (See Fig. 2.) Nearest its front edge is the row of buttons for ringing the calling-up subscriber's bell; second, a row of cam lever switches for the operator's listening connection; third, one set of plugs and flexible connections. There are 48 of each of these in one section. Fourth comes the row of 6,000 answering spring jacks, with, fifth, a correspondingly numbered set of 6,000 calling-up annunciators, 150 to a section. Sixth comes the row of clearing-out annunciators, one for each pair of plugs, or 48 to a section; and seventh, the second set of plugs, completing the pair. This completes the contents of the keyboard. Back of it rises the main board, with its quarter million spring jacks, 6,000 in a section. The general arrange ment may be seen in the diagram of keyboard connections already referred to.

In the rear of the cellar is the lighting plant for supplying current for nearly eight hundred lamps contained in the building, as well as for ringing subscribers' bells. It comprises two Edison and two Electro-Dynamic Co.'s dynamos, driven by Buckeye engines. The generators are so arranged that they work in connection with a storage battery, charging it and also supplying lamps with current. At night the battery is relied on for lighting. It comprises 580 cells (Fig. 5) arranged in ten series, giving an output of 300 amperes at about 125 volts potential.

The cells are continually tested with the hydrometer to determine when they are exhausted and when charged, the acid being kept within the limits of 1,160 and 1.200 specific gravity. The voltage of a single cell is never allowed to fall below 1·9. The plant is provided with ammeters and all appliances of the most advanced order.

In a subsequent issue the subject of underground distribution of electric currents for light, telephonic and telegraphic communication, power, etc., will be treated in detail, with full illustrations. The subject of local connections with the through lines and the means of making connections with them will be included, thus fully explaining the solution of underground transmission of electric energy.

The Future of Iron.

This product, which, from the immense extent of its uses, and its applications to the true necessities of mankind, would seem properly stable in its very nature, has during the last two decades suffered much from violent fluctuations. At present the iron trade is reported to be in rather a depressed condition, which would be worse except for a combination among the manufacturers which keeps the production down sufficiently to maintain prices on a paying basis. All over the country mills are starting into action and shutting down, a species of restlessness characterizing the outlook. But an increased market is looked for during the next three months, and after the lessons of the past an improvement that lasts even for that length of time will not be without good effects. The government by its recent operations in ship and ordnance construction has done something to help matters, and probably the same assistance will be rendered during the next four years.

Dowling, not Darling.

An article in our last issue referring to a paper read before the New York State Homeopathic Medical Society on heart disease was erroneously credited to Professor Darling. The types should have read Professor J. W. Dowling, M.D., of the New York Homeopathic Medical College.

The World's Industries.

The report from the consuls of the United States from different parts of the world for the month of January, 1889, is just issued, and from its pages we cull some valuable statistics and useful information on a variety of subjects upon which, we think, the reader will be interested.

THE PHILIPPINE ISLANDS.

The principal islands are divided into twenty-seven provinces, thirteen of which are on the Isle of Luzon; four on the Isle of Negros; three on Panay; and four on Mindanao. Each of these islands has its governor, and each province and district has its "gobernadorcillo," or sub-governor. The principal cities and shipping ports, and the only ones that do any foreign trade, are Manila, on the Isle of Luzon; Iloilo, on Panay; and Cebu, on the island of that name.

According to Alexander R. Webb, stationed at Manila, Spanish is the official language, and is, practically, the only language spoken. Those American business men who desire to extend their trade to this particular part of the world should understand at the outset that a knowledge of Spanish is indispensable, and that they will greatly advance their interests here if they conduct their correspondence in that language, unless it is addressed to the one American or five or six English houses; and even in those all the employes speak Spanish. Mr. Webb mentions at great length the resources of the Philippine Islands, of which the city of Manila is the principal shipping port. Mr. Webb thinks American goods cannot compete in price with Germany, England, and Switzerland in manufactured products of the fancy sort known here as "notions," but that paper bags are much needed, and that tin ware, and all sorts of cooking utensils, wooden ware, sewing machines, canned goods, agricultural implements, would meet with good sale.

Paper bags and good wrapping paper and twine, such as one sees in the stores of America, are unknown here. You make a purchase at a grocery store, and if the article in in a tin can or box, you are expected to take it as it is without a wrapper; if it is something that requires a wrapper, you will get it rolled up in an old Spanish newspaper or a scanty piece of Chinese paper, something like the inside wrapper of a bunch of fire crackers, which will tear upon the slightest provocation. It is rolled, but you get no string tied around it, and must take the chance of spilling your purchase before you reach your destination. Speaking of the horses, Mr. Webb says they are very small, and he does not understand how they keep alive under the brutal treatment they receive and heat of the climate. They are thrashed up and down the streets from early morn until far into the night, hauling passengers hither and thither, probably only half fed, and yet apparently healthy and vigorous at all times. Some of them look a little discouraged, but the majority are in good condition. They are never used, however, for hauling freight or other heavy loads; that sort of work is left to the Chinese coolies and "carabaos" or water buffaloes. The latter animal is about the size and shape of a half grown ox, with a hide like an elephant's, and a pair of great curved horns about 6 inches in diameter at the base, and from 2½ to 3 feet long. These beasts are hitched singly to small, low, two-wheeled drays and haul enormous loads at a most aggravatingly slow pace.

DECORTICATING AND CLEANING RAMIE.

The prizes offered by the French government for the machines best adapted to the decortication of ramie, which were awarded last autumn, did not prove as satisfactory as was hoped, in view of the efforts made and the number of premiums offered. According to Consul Charles P. Williams' report, there were nineteen entries of machines for decortication and ten different processes for treatment of the fiber on the list of exhibits. Three decorticating machines only took part in the competition. The principle upon which the two French machines worked was similar to that of the two Berthet machines, the reversion of the stalks in the former being accomplished by hand, while in the latter it is automatically done.

The machine termed "Landsheer," which took the first prize of 600 francs, and the "Armand," to which was awarded 400 francs, both claimed to do their work in stalks both green and dry. The former machine costs from 1,500 to 2,000 francs, the latter about 1,500 francs.

The third machine, to which was awarded a recognition in the way of a nominal prize of 200 francs, was presented by the American Fiber Company, of New York. It is simply just to say that a machine had been hastily prepared to exhibit the system adopted by the company in decorticating the ramie, while insufficient time prevented the completion of details which would render it capable of successfully competing in the quality and quantity of its work with machines which had been studied and improved upon for a long time. The principle exemplified by this machine is that of splitting the stalk in two pieces, and as the ribbon is stripped from each piece the stalk is broken into short lengths and dropped. The ribbon is continuous, and the waste much less than by any other process. With some alterations and adjustments, which apparently are easily attainable, this machine would become very popular. The machine can be simplified and bids fair to carry off the prize at the French International Exhibition next year. The machine did its work better on the green than the dry stalks.

It was impossible to determine the amount of work which either of these machines could accomplish, as the stock of ramie was badly assorted and in poor condition. Enough could be gathered from this exhibition to confirm the belief that the difficulties are great, if not insuperable, in decorticating the ramie in the dry state. The character of the decortication was made evident in the subsequent processes of spinning and combing by the quantity of waste.

The effort required to separate the ribbon from the wood in the dry state is far greater than in the green state, when the bark peels readily, assisted by the gummy substance surrounding the stalk, which in the dry state acts like a cement.

When the attempt to separate the fiber from the woody pith is attempted in the dry state, even if none of the fiber should adhere to the wood, the force required to separate it is necessarily so great that the continuity of the fiber is less perfect and the waste more considerable when subjected to the subsequent processes necessary to utilize it.

THE SOUTH AMERICAN REPUBLICS.

Increasing interest centers in the Spanish South American colonies, not only by our people, but by other commercial and manufacturing nations, who are on the alert for a market where they can exchange their wares for the products of other countries.

Venezuela, Colombia, Ecuador, Peru, and Bolivia are among the most prominent states toward which enterprising merchants from other countries are turning their attention and establishing trade.

Alexander R. Jones, consul at Barranquilla, Colombia, says: The commerce of Colombia is with England, France, Germany, and the United States.

The principal exports are coffee, cotton, hides, bark, balsam, tobacco, ivory, nuts, and cotton seed; and of the mines, he says Colombia is without doubt rich in mineral resources. The mountainous part of the interior abounds in gold and silver, and in some parts iron is found in considerable quantities, while on the coast, in the region of Santa Marta, copper exists. The working of the iron mines has not proved a success, while the copper has not been attempted. An American mining engineer has lately reported petroleum in very considerable quantities to exist in Tubara, twelve miles from Barranquilla, and within the limits of this consular district. But the principal mines are of gold and silver. Until a few years ago, these mines were almost entirely in the hands of the English. But recently there has been an influx of American enterprise, capital, and machinery. It is too early yet to say what will be the outcome of this, but with better communication and facilities for getting the heavy machinery into place, there seems to be no reason why mines will not be worked to advantage.

Agricultural pursuits are in a most primitive state. In fact, agriculture, as understood in the United States, may be said not to exist. No machinery is in use, and the native disdains even the use of the ax, preferring yet the old and more laborious instrument, the machete. The machete is a half-knife, half-scythe instrument, greatly resembling the American corn knife. It will be many years before the improvements which make the drudgery of agriculture easy are adopted in Colombia.

Manufactures in Colombia may almost be said not to be worth naming. With the exception of common soap, there is nothing manufactured which begins to cover the demand, unless it be the wretched rum of the country. In every manufacturing enterprise of importance which has found a footing in Colombia, it has been necessary to depend wholly upon the importation of foreign skilled labor. The average Colombian brain is absolutely devoid of the genius of invention, if not, indeed, of the very power of imitation.

[CHEMICAL NEWS.]

Indian Ink.

I find that a color apparently identical to Indian ink can be produced by the action of sulphuric acid on camphor.

An excess of camphor should remain some twenty-four hours in strong sulphuric acid; it then results in a gelatinous mass of a slightly reddish color. This, when heated, effervesces, gives off fumes of sulphurous acid, and turns intensely black. By evaporation the superfluous sulphuric acid and camphor (for there remains an excess of both, the weakened acid not acting on the camphor) can be driven off. The remainder when applied to paper as a paint appears, to my unartistic eye, to be Indian ink.

When dissolved in water, it remains an indefinite time without precipitating. It appears to be dissolved, not held in suspension. B. PIFFARD.

Metallurgic Notes.

Aluminum Irons.—A notable event of the past year was the publication of an important paper by Mr. Keep, of Detroit, giving the results of a careful series of experiments upon the influence of additions of aluminum to cast irons, with special reference to the improvement of inferior irons by such additions, so as to adapt them to foundry uses. The results of these investigations appear to establish the fact that small additions of aluminum (in the form of ferro-aluminum) up to one per cent exert a distinctly favorable influence on cast iron, permitting the production of soft and faultless castings from irons heretofore regarded as altogether unfit for foundry use. Some question has been raised as to whether the results noted by Mr. Keep should not be attributed, at least in part, to the silicon in the aluminum alloy he employed; but the preponderance of evidence appears to be in favor of the view that the influence of small additions of aluminum to cast iron is no less marked and favorable than it is known to be in the case of wrought iron. The interest excited by the announcement of these results is shown by the fact that a considerable demand has lately sprung up for ferro-aluminum for foundry use. Should Mr. Keep's results be verified in practice, they will prove of the highest importance to foundrymen.

It is worthy of notice, in connection with the unusual share of attention that has of late been given to the subject of the cheap production of aluminum, that the general sentiment among metallurgists respecting the practical value of this metal has undergone a considerable modification. Sober second thought, now that the day of cheap aluminum appears to be drawing nigh, has dispelled many of the extravagant notions that formerly were entertained, even by men of science, respecting the possible utilities of this elusive metal. The more carefully its properties are studied, the more probable does it appear that it will always hold a subordinate place in the arts, and that its greatest utility will be derived from its alloys, which, with diminishing cost of production, will come into very general use in the arts of construction.

Manganese Steel.—The effect of the presence of manganese in steel has been made the subject of careful study, and it is believed that the constructive arts will shortly be the gainers by the possession of a metal possessing altogether new and highly valuable properties. The most interesting results have been obtained with steel containing as much as ten to fourteen per cent of manganese. It has been found with this material that, notwithstanding its considerable toughness when cast in the ordinary way, an extraordinary gain in strength is obtained by methods which, in the case of ordinary steel, would cause brittleness, water cracking, and other defects. The process is termed "water toughening," and consists in heating the article under treatment to about 1,800° to 2,000° Fah., and then plunging it into cold water. The nearer the above temperatures are approached, and the colder the water, the tougher will be the material. After water toughening, notwithstanding their hardness and stiffness, it was found that test specimens could be bent double, cold, almost in the same way as a piece of the mildest forged steel, thus proving that the new alloy combined the apparently contradictory qualities of hardness and toughness. It is believed that manganese steel treated by this toughening process will be found especially well adapted for railway car wheels, car couplings, and similar uses.—*Jour. Franklin Institute.*

Refilling of Old Coal Mines.

An ingenious artifice that has lately been successfully put in practice at Shenandoah by the Reading Company, at the Kohinoor colliery, for refilling the excavations from which coal has been taken out, is worthy of mention, since it is desirable that it should be imitated elsewhere throughout the coal regions where similar conditions prevail. The method is both simple and effective, and prevents the caving in of the earth above, and the consequent loss of valuable property, which has not been infrequent in the mining towns of the anthracite region. Besides, the valuable pillars of pure coal, which for many years it was customary to leave in the mines to prevent falling in of the roof, can now be taken out without fear. A coal dirt conveyer, consisting of a series of semicircular chutes, similar to those used in discharging coal from carts into cellars, and an endless chain with scrapers attached, automatically conveys the fine refuse from the coal breakers to an elevation, from whence it is discharged into a second chute. As the coal dirt falls on this, water, pumped from the mines, mixes with it and carries the stuff, in a semi-liquid state, back through a jig or puddling hole into the bowels of the earth, from whence the coal has been removed. The coal dirt settles to the bottom of the breasts and packs closely, and the water seeks an outlet below, to be again pumped out to repeat its duty. The cost of this puddling the refuse matter back into the mines, about three to four cents per cubic yard, is very small compared with the value of the pillars of marketable coal of which the mines may be safely "robbed," and the security obtained for dwellings and railroad property on the surface, above the mines. Already more than two acres beneath the city of Shenandoah, from which the coal had been mined, have been again solidly refilled with the coal dirt which used to be piled mountains high around the town.—*Jour. Franklin Institute.*

PHOTOGRAPHIC NOTES.

Plates for Development with Plain Water.—Mr. Leo Backelandt, a well known Belgian chemist, has just issued plates covered on the back with salts fit for the development of the image. It suffices to immerse the plate in ordinary water, and this immersion dissolves the reducing salts, and the image is developed. It is a very ingenious idea. We have just made a successful trial of these plates, and we think that they will be appreciated by amateurs desirous of dispensing with the trouble of preparing developing solutions beforehand. The fixing agent, ready powdered, is also inclosed in the box containing the plates; so that we have at once the sensitive film, the developer, and the fixing salt all to hand in the solid form. If the thing is really as good as it appears to be at first sight, what facility is offered for photographing on a journey in the country, etc.! We think that by the help of papers impregnated with developing salts the same result may be obtained, and then this method will be applicable to plates, papers, and pellicles of all makes.—*Leon Vidal, in Photo. News.*

Rapid Hydroquinone Developers.—A point of great importance is stated by Captain Himly, and his statement concurs with what has reached us from other quarters, namely, that the addition of a small quantity of caustic alkali to either the carbonate of potash or soda developers confers more brilliancy and more detail upon the negative, advantages independent of that for which it was added—its great accelerating influence. This is a very curious and unexpected result, the general effect of an accelerated developer when using pyro and ferrous oxalate not being in favor of additional brilliancy, at all events.

As to the use of meta-bisulphite of potash, Captain Himly finds that, when used in too great proportion, it retards development considerably, but is notably more powerful as a preservative in the solution than sulphite of soda alone. When color of the image is important, however, it is not desirable to omit the sulphite of soda, or even to reduce the amount of it, when meta-bisulphite of potash is used, as the former salt has such a beneficial effect upon the color of the deposit.

As the result of Captain Himly's researches, he recommends the following developer, here put into English measures:

HYDROQUINONE AND CAUSTIC SODA DEVELOPER.

Solution A.

Hydroquinone	40 grains.
Meta-bisulphite of potash	16 "
Water	2¼ ounces.

Solution B.

Caustic soda	1 ounce.
Water	8 ounces.

To 5 ounces of water, ½ ounce of each the above solutions is added. This developer is recommended as very good for negatives, but not for positives upon bromide of silver emulsion paper, as the tone is very unequal, and for the most part of a reddish color.

HYDROQUINONE AND POTASH DEVELOPER.

Solution A.

Hydroquinone	40 grains.
Meta-bisulphite of potash	16 "
Water	2¼ ounces.

Solution B.

Carbonate of potash	1 ounce.
Sulphite of soda	½ "
Water	10 ounces.

For development, ten parts of A and from fifty to seventy-five parts of B are added to from fifty to twenty-five parts of water, according as it may be desired to produce a soft or a powerful negative. As accelerator, six minims of the one in eight solution of caustic soda above mentioned is to be added. The addition is stated to have also a favorable influence upon the color of the deposit. This developer is also recommended as very suitable for positives.

HYDROQUINONE AND SODA DEVELOPER.

Solution A.

Hydroquinone	40 grains.
Meta-bisulphite of potash	20 "
Water	2¼ ounces.

Solution B.

Carbonate of soda	1 ounce.
Sulphite of soda	½ "
Water	10 ounces.

For development, to ten parts of A from fifty to seventy-five parts of B are added, and fifty or twenty-five parts of water, as with the potash developer.

This developer also works noticeably better when six minims of the one in eight solution of caustic soda as accelerator is added. The developer works exceedingly well, both for negatives and for positives upon bromide of silver emulsion; and is especially good for the latter purpose, the tone being very even. It is recommended, before washing, to immerse the print for a short time in a dilute acetic acid solution, which discharges any yellow color that may have appeared upon the paper. The use of a bromide as a restrainer is unnecessary, this function being sufficiently fulfilled by the meta-bisulphite of potash.

In the table of comparative results given by Captain Himly, caustic potash shows a less favorable action than caustic soda, and the latter is therefore recommended. On other accounts—less cost and greater freedom from impurity—soda is also to be preferred.

The carbonate of soda required is not the powder sold under that name, and known also as sesqui-carbonate and bicarbonate, but the crystals. Washing soda, if moderately pure, generally answers perfectly. The precaution of using for the hydroquinone solution either distilled water or water that has been boiled and allowed to cool, must be observed, as well as that of thoroughly dissolving the sulphite—when sulphite of soda is used—before the addition of the hydroquinone. Sulphite of soda must be in good condition—must not have effloresced.

Development by hydroquinone has been making way by leaps and bounds. The present modification—that which removes the one most serious objection hitherto raised to its use (slowness of action)—appears at the same time to confer additional good qualities to the negative itself, and seems likely to bring the method into a much more extended application than it has hitherto enjoyed.—*Photo. News.*

Time Servers.

How many men there are, holding good, paying positions as journeymen, who are really of no value unless kept constantly under the eye of the foreman or their employer! They are simply time servers, who take no interest in the business they represent beyond the actual time necessary to count them a day's work. They work when closely watched because they are obliged to, not from any motive of honor or interest in the business.

What can be expected of such workmen but that they will shirk their work and idle their time at every opportunity?

If you cannot give your employer your full time for which he pays, and take some interest in his business, you had better leave him at once. To this he is entitled, and has a right to expect it of you.

If your mind is not upon your work, you cannot expect to accomplish it with any degree of satisfaction to your employer or credit to yourself.

In going about from one shop to another it is a very easy matter to pick out the time servers. Upon the slightest pretext they drop their work to talk or look about, and are always ready to get out of the door the moment the clock strikes six, and their example is very rapidly followed by the apprentice or younger workmen. They have to be constantly watched, and this fact, being known to the firm, is not long in having its results.

Employers are more generally knowing to the habits and qualities of the men they employ than the men often realize, and they invariably know who are the time servers among them, so that when there comes a convenient opportunity or a lull in business, these are the first to be discharged.

It pays to be faithful and to do your best at all times, and more especially when your employer is not watching. If you must idle away time, do it when he is about, but don't dishonor yourself or betray his confidence by taking advantage of his absence.

This is one of the worst features of our American system. It is an example which is set by the older men, and which is readily adopted by apprentices, and it is the exception rather than the rule that we find a young man who is sufficiently interested in his own welfare and his employer's as well to give his full time and attention to his work. Those who do this are sure of success, and it is from among such that have risen those men whose names are written upon the pages of history as having made their mark in the world, and left behind not only pleasant recollections, but a shining example that is worthy of a careful imitation.—*The Practical Mechanic.*

Peach Stone Fuel.

It has been demonstrated in Vaca Valley that peach stones will make as good a fire for household purposes as the best kind of coal in the market, says the Vallejo (Cal.) *Chronicle.* The fruit growers, instead of as heretofore throwing the pits away, dispose of the stones at the present time at the rate of $6 a ton. A sack of the stones will weigh about 80 pounds and will last as long as an equal number of pounds of coal, and give a greater intensity of heat. At many of the orchards in the valley may be seen great stacks of peach and apricot stones which will eventually find their way to San Francisco and other places to be sold for fuel. The apricot stones do not burn as readily as the peach, and will not command as good a price. The fruit raisers will undoubtedly be pleased to learn that they now have another source of revenue open to them. A large number of peaches are dried during the summer season for shipment. As soon as the owners find that they have a market for the stones, a greater number of pounds will be dried than heretofore.