

# SCIENTIFIC AMERICAN

[Entered at the Post Office of New York, N. Y., as Second Class matter. Copyright, 1895, by Munn & Co.]

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

Vol. LXXIII.—No. 7.  
ESTABLISHED 1845.

NEW YORK, AUGUST 17, 1895

[\$3.00 A YEAR.  
WEEKLY.]

## PHOTOGRAPHIC PRINTING BY MACHINERY.

This new process of rapid printing consists essentially of a roll of sensitized bromide paper a thousand yards in length by something over a yard in width, unwound in a room illuminated by red light, fed under two or more negatives, then automatically pressed upward by a platen against the face of the negative, at the same instant also automatically exposed by the flashing of incandescent electric lamps above the negatives, then moved along the proper distance for a fresh section to be exposed and finally wound up on another roller.

The roll of exposed film is next removed to another room and automatically developed, fixed, alumed, washed and dried, the finished pictures being wound up on a third roll from which they are cut to size and mounted on cards in the usual way.

Actually to see how easily and certainly this process works and learn of the obstacles that had to be overcome

not only surprises but astonishes the old time photographer. It is, in fact, a new industry in the line of photographic printing and will be useful in hundreds of various kinds of businesses, where prints by hundreds or thousands from one negative are desired.

The accompanying illustrations sketched from the apparatus in operation give a very good idea of its construction and working.

Taking the exposing apparatus first, Fig. 1, the roll of unexposed paper supported on a shaft on the left may be seen hanging therefrom in a loose loop and enters the inclined apron, thence passes directly under the negatives, which are secured to the underside of a large sheet of glass by paper strips in the usual way. The glass plate is held in a removable frame, which permits the negatives to be easily located and secured. When the plate is in position vignetting masks are laid on top of the plate over the negative, and if, by a trial, the exposure has been found too long for one negative, thin sheets of waxed or tissue paper are interposed to weaken the light to the proper degree. Several negatives of a similar degree of density may thus be secured to the plate and each adapted to the light necessary for a proper exposure. Much care and nicety of judgment is required in this adjustment, as the success of the later manipulations hinges upon it. Above the negative

plate is observed the exposing chamber suspended by a rope passing over a pulley, in the ceiling, and balanced at the other end by a weight; this arrangement permits the whole to be raised above the negative plate, giving easy access thereto for the adjustment of vig-

netting masks. In each side of the case are four 32 candle power incandescent electric lamps connected by flexible cords to a switch on the wall and to the automatic switch below. The heat from the lamps was found to be excessive and ventilation was obtained and the temperature kept quite uniform by forcing in a current of air with an electric fan or air pump. A square red window on the side allows one to observe that all the lamps go when the switch is turned on.

After exposure the paper is wound over a pull roll, adjoining the exposing chamber, by an intermittent quick movement equivalent to the length of the negative plate or at any set distance, passing thence to a roll whose axle works in ball bearings, on which it is wound, the roll being rotated by an attendant. A reciprocating motion is imparted to the pull roll by means of a connecting rod attached to a crankshaft located under the feed apron, at the lower left hand portion of the machine. The end of the connecting rod at the pull roll engages in a slotted lever, the upper end of which has a ratchet and pawl operating in teeth on the periphery of the pull roll. The end of the rod may be moved nearer the center of the roll in the slotted lever, and so regulate the throw or amount of rotation. A sprocket wheel at the opposite end of the pull roll is connected by a chain with the feed roll. It is evident, therefore, when the pull roll makes a half revolution rapidly, the feed roll is also simultaneously rotated, causing the same amount of paper to be unwound as is taken up at the other end. Geared with the crank shaft under the feed apron is a shaft having a cam for operating at the right moment the electric switch for the lights and another cam for lowering the platen (see Fig. 2). Prior to the moment of exposure, the cam, as it rotates, permits the pivoted weight to draw the bell crank lever supporting the platen forward, and press the platen upward against the underside of the paper, placing the sensitive side of the latter in contact with the negatives during the interval of exposure (usually two seconds). it is then drawn down until a fresh section of paper passes under the negatives and the operation repeated. The movement is quite similar to the platen of a printing press.

netting masks. In each side of the case are four 32 candle power incandescent electric lamps connected by flexible cords to a switch on the wall and to the automatic switch below. The heat from the lamps was found to be excessive and ventilation was obtained and the temperature kept quite uniform by forcing in a current of air with an electric fan or air pump. A square red window on the side allows one to observe that all the lamps go when the switch is turned on.

After exposure the paper is wound over a pull roll, adjoining the exposing chamber, by an intermittent quick movement equivalent to the length of the negative plate or at any set distance, passing thence to a roll whose axle works in ball bearings, on which it is wound, the roll being rotated by an attendant. A reciprocating motion is imparted to the pull roll by means of a connecting rod attached to a crankshaft located under the feed apron, at the lower left hand portion of the machine. The end of the connecting rod at the pull roll engages in a slotted lever, the upper end of which has a ratchet and pawl operating in teeth on the periphery of the pull roll. The end of the rod may be moved nearer the center of the roll in the slotted lever, and so regulate the throw or amount of rotation. A sprocket wheel at the opposite end of the pull roll is connected by a chain with the feed roll. It is evident, therefore, when the pull roll makes a half revolution rapidly, the feed roll is also simultaneously rotated, causing the same amount of paper to be unwound as is

taken up at the other end. Geared with the crank shaft under the feed apron is a shaft having a cam for operating at the right moment the electric switch for the lights and another cam for lowering the platen (see Fig. 2). Prior to the moment of exposure, the cam, as it rotates, permits the pivoted weight to draw the bell crank lever supporting the platen forward, and press the platen upward against the underside of the paper, placing the sensitive side of the latter in contact with the negatives during the interval of exposure (usually two seconds). it is then drawn down until a fresh section of paper passes under the negatives and the operation repeated. The movement is quite similar to the platen of a printing press.

The roll, containing two or three thousand exposures, is carefully protected from white light and carried to the room in which is located the automatic developing machinery. (Fig. 3.)

It is a most interesting sight to see the gradual development of the exposures here. As may be imagined, the exposed roll is set on supports at the right hand end of a long wood tank containing separate watertight compartments, and is carried over a roll into compartment No. 1, about 3½ feet deep, filled with 120 gallons of an old solution of ferrous oxalate of potash developer. Referring to Fig. 4, it will be noticed that half way

(Continued on p. 102.)

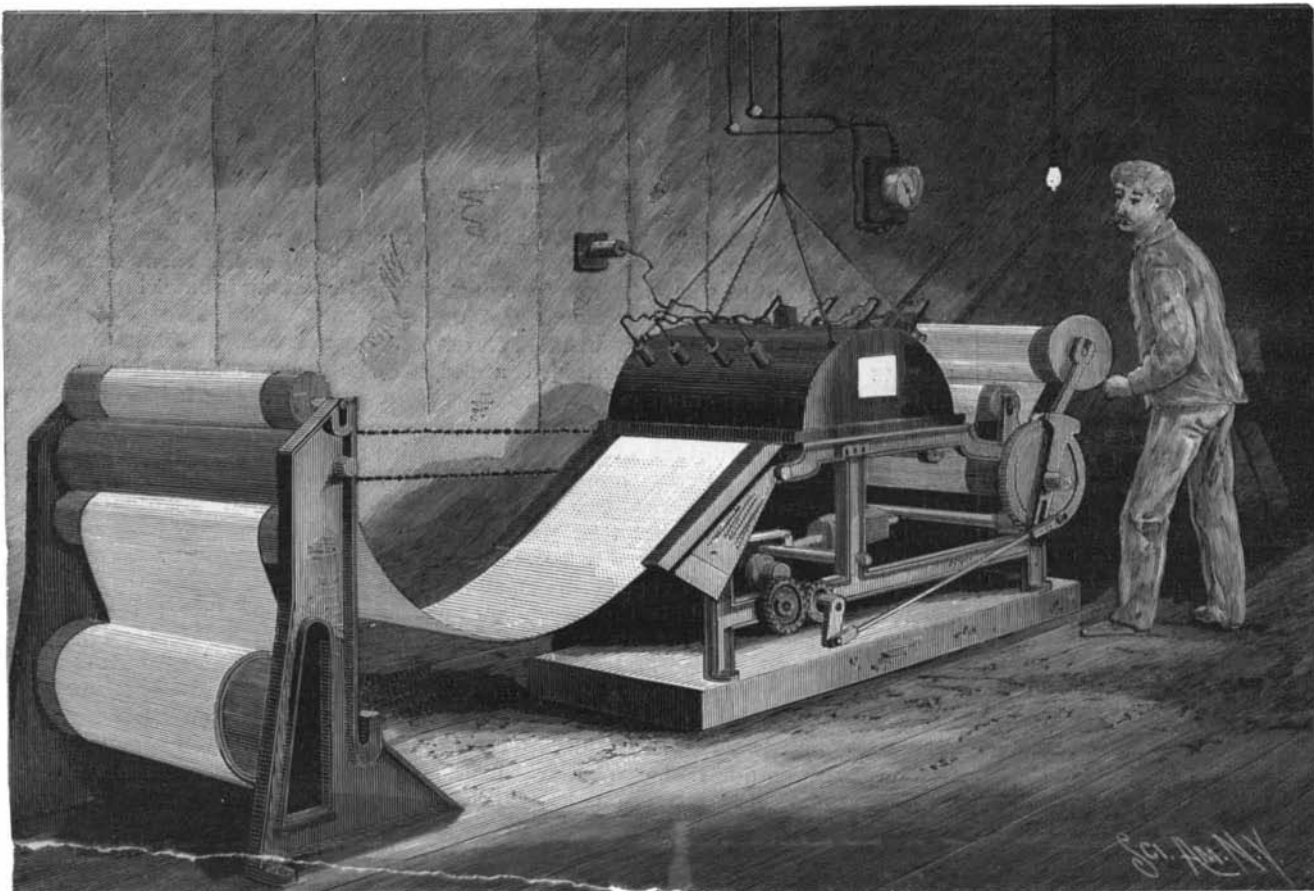


Fig. 1.—AUTOMATIC PHOTOGRAPHIC PRINTING—THE EXPOSING APPARATUS.

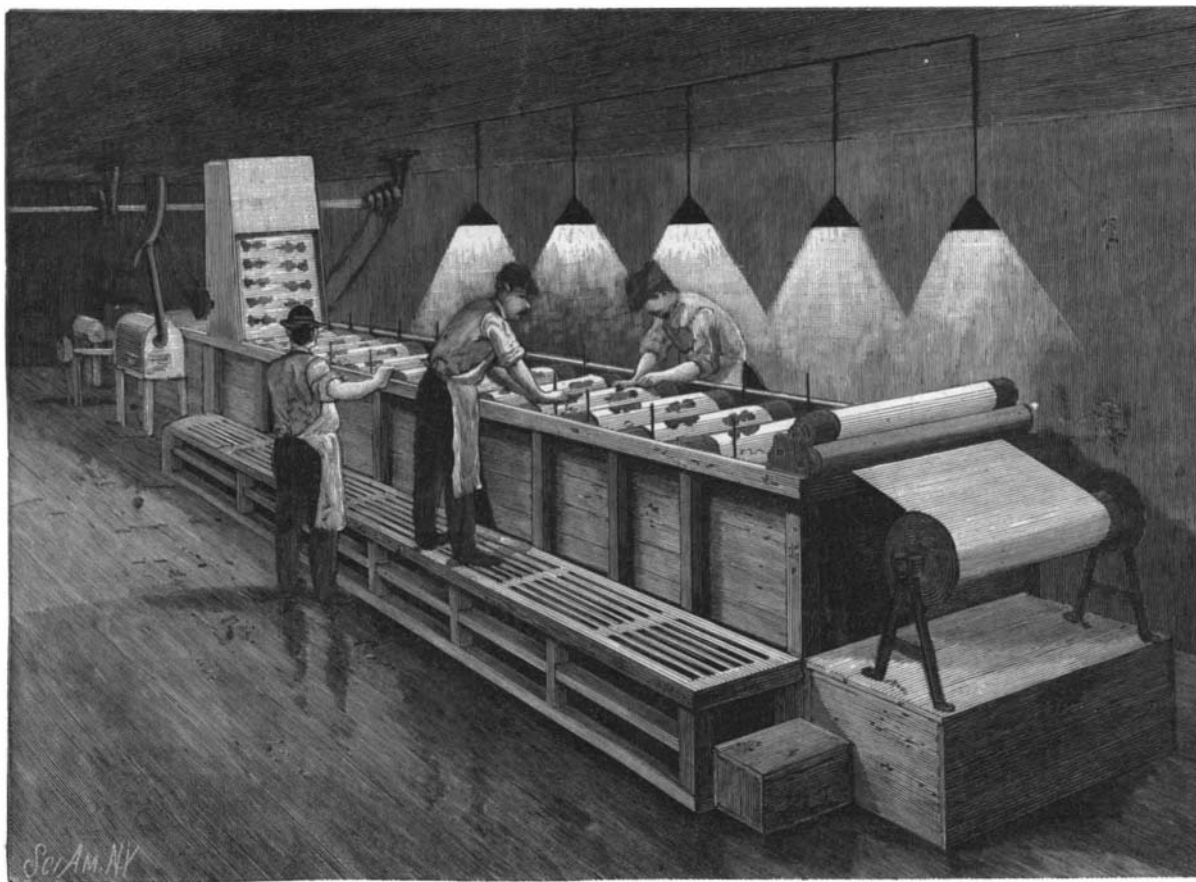


Fig. 3.—AUTOMATIC PHOTOGRAPHIC PRINTING—THE DEVELOPING APPARATUS.

## PHOTOGRAPHIC PRINTING BY MACHINERY.

(Continued from first page.)

up from the bottom of this compartment is a submerged roll. Running down vertically in the center of the sides of each compartment is a slotted way to guide the axes of small, loose, brass rollers which carry the paper to the bottom and freely revolve as the paper moves forward.

Over the division of each compartment is an actuating roll, all being geared to a worm screw running along the top edge of the long tank its entire distance, which gives every roll the same speed.

The paper, after passing over the submerged roll (Fig. 4) and down again, thence up out of the tank over the roll between the first and second tanks and down into the fresh ferrous oxalate developer in this tank, shows the images half developed out. The electric lamps overhead are a non-actinic red.

Coming out of the second tank, the images are fully developed, thence the paper passes on into the third vat, containing dilute acetic acid, which dissolves out all of the iron left in the paper from the developer, and acts as a check to further development, thence in the next vat the paper is washed with water; next it passes into a fixing vat containing a solution of hyposulphite of soda, is again washed in the following tank, then it passes into a vat of alum water, which hardens the film, and finally goes through two or three vats of water, receiving a final spraying, as shown in Fig. 4.

From the last spraying it is led onto an endless canvas carrier into a long inclosed chamber filled with a current of warm air, heated by a gas furnace noticed near this end. At the end of this heated chamber the paper comes out perfectly dry, and is rolled up with the pictures all on it. When the run is complete the roll of pictures is unwound, they are cut off to the respective sizes desired, and mounted in the usual way.

While the paper is traveling over the several rolls, attendants with sponges sponge off any dirt or light material which may cling to the surface as it is drawn up from the solutions. At the further end of the trough the paper with the pictures upon it may be seen traveling upward.

A very curious anomaly is the mixture of white and red light in the developing room. The two lamps over the developer and roll where it is unwound are red, while all the others are white. There is just enough red to neutralize the white at the beginning. Thus it makes the brightest dark room we call to mind, and was a surprise in the art of photographic manipulations.

There are twenty-seven rollers on the large box tank, and the tank itself is not far from one hundred feet in length. The paper travels through the tanks at the rate of ten feet per minute, and it is possible to arrange enough cabinet negatives in the exposing machine to expose 245 cabinet pictures in a minute. But an ordinary day's work of ten hours yields 157,000 cabinet pictures.

We are informed this is the only machine of its kind in this country, and but one other is in Germany. The work which we saw made by it was very satisfactory and uniform.

In dealing with such large quantities of material, uniformity appears to be easily attained, and the applicability of a similar machine, properly modified to

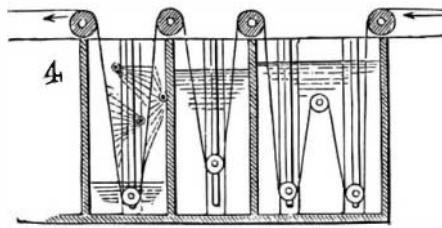


Fig. 4.—THE DEVELOPER TANK.

the development of negatives and films having had reasonably uniform shutter exposures, may be a possible outcome of this invention.

For the foregoing particulars we are indebted to the Automatic Photograph Company, No. 25 West, Twenty-fourth Street, this city, through whose courtesy we were permitted to witness all the details of this remarkable and interesting apparatus and plant.

## The Use of Naphtha.

The greatest care should be observed in the use of naphtha, which while a most valuable agent to clean delicate laces, light silks and ribbons, is a very dangerous liquid. It is so extremely volatile that ignition will take place even when it is removed by the distance across a room from a light, and it should never be used except in the daytime. Articles cleansed by this means should be promptly and thoroughly aired; it is a good plan, the Commercial Bulletin suggests, when the weather permits, to do the cleaning out of doors, leaving even then the things cleansed outside for a longer airing.

The need for this was recently emphasized to an uptown woman, who washed a number of gloves, some

laces and ribbons, and, fearing to leave them around the room, as she was called away before they were aired, bundled them into a box, which she shut up in a trunk in a closet.

Later, she sent a maid to get them out, who took a lighted candle to the closet for the search. When the trunk was opened, a slight explosion followed almost immediately. Enough of the gas from the naphtha had been generated and held in the confined space to ignite as the candle flame approached. No serious results followed, fortunately, but the warning remains.

## Last of the Philadelphia Cable Cars.

A few days more will witness the ending of the cable system as a means of passenger transportation in Philadelphia. Within a week every remaining cable car on the Market Street main line, the last link in the cable system, will be displaced by trolleys. The passing of the cable cars marks a step in the progress of street railway facilities in Philadelphia. When the system was introduced, it was looked upon as a solution of the problem of rapid transit, and on the strength of this opinion the Philadelphia Traction Company invested a fabulous sum, estimated to be in the neighborhood of \$8,000,000, in equipping the Market Street, Columbia Avenue, and Seventh and Ninth Street lines. But while they were an improvement over the jogging horse cars, they by no means proved satisfactory, and it is with no regret that the cable system has followed the horse car line in giving place to the trolleys. The cost of construction of the cable lines was enormous in comparison with the equipment of the trolley lines, the cost of operation was greater, and the service ren-

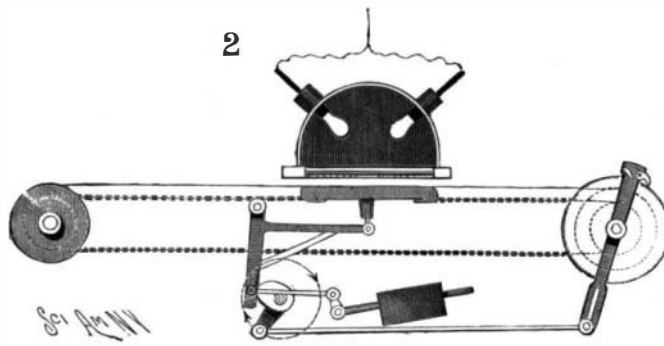


Fig. 2.—DETAIL OF EXPOSING APPARATUS.

dered was less efficient. As a consequence, the cable cars have been forced out of service by the system which has demonstrated its superiority. The machinery at the power stations, now lying useless and idle, represented to the Traction Company an immense amount of money, and it would appear on the surface to be a sheer waste of hundreds of thousands of dollars to dispose of all the gigantic driving gear for a mere song to be broken up for scrap iron. Yet it is useless for any other purpose, and the Traction Company has disposed of it all to a scrap iron firm for the best bargain it could obtain—the great winding drums, around which the greased cables passed, and the heavy driving machinery, weighing thousands of tons, all of which are to be converted into iron and steel junk. Of all the machinery in the immense plants, the engines and boilers are alone valuable above the price of old iron.—Philadelphia Record.

## An Automatic Letter Registering Machine.

There were in the United States on the first of January 69,912 post offices, and every postmaster is obliged, when requested, to register letters and other mail matter offered, on payment of a charge of 8 cents therefor, and give the sender a receipt. This does not make the government responsible for loss, but facilitates tracing up such mailed matter when necessary. But the taking of a letter to a post office to obtain registry and a receipt therefor from the postmaster or his assistant requires time, and is often attended with not a little inconvenience. To obviate this difficulty a coin-controlled registering machine, applicable also for other purposes, has been invented and patented in the United States and various foreign countries by Count Detalmo di Brazza Savorgnan, of Rome, Italy, at present residing at the Hotel Savoy, New York City.

The machine has a locked registering table and letter-receiving box, to be unlocked by a coin dropped in a slot, which sets in motion mechanism for weighing and numbering the letter or package and dropping it into the letter box, also correspondingly dating, numbering and delivering a receipt therefor. A duplicate register, accessible only to the post office officials, is at the same time made upon a paper band within the machine, this band being formed into a book, and the machine having devices by which it becomes inoperative when the supply of record paper is exhausted. The mechanism for controlling the different movements and operations so that they must occur in regular sequence is described in full detail in the patent, and the Patent Office has allowed twenty-six claims for novelty in the invention. It is designed, by the

aid of this improvement, to render it possible to register a letter almost as conveniently as one now drops it into a letter box, these machines being provided at suitable places, as in the leading hotels, large office buildings, etc. We understand that the New York post office officials intend to place one of the machines, when completed, on trial in this city.

## Atlanta Exposition Notes.

Mr. A. Macchi, Commissioner-General for Europe for the Cotton States and International Exposition, has returned to America to superintend the installation of the exhibits from the European countries, which comprise splendid products from Belgium, France, England, Germany, Austria, Hungary, Italy and Russia. The exhibition of foreign-made bicycles is likely to prove of particular interest. A fine opportunity of comparing the foreign machines with those of American make will be afforded. Manufacturers in England, France and Italy will send bicycle exhibits. Great Britain has been quick to appreciate the advantages of exhibiting at the fair, as she consumes large quantities of the products of the cotton States.

The exhibit of the mineral resources of the United States to be made at the Atlanta Exposition, under the direction of Dr. David T. Day, of the Geological Survey, will be, the doctor says, the most thoroughly representative and best classified exhibition of the mineral resources of the country.

The feature of the exhibit will be four oil paintings, each 120 feet long, showing four sections of the Appalachian range of mountains, drawn on the scale of one foot to a mile. By these paintings every mineral and coal vein in the Appalachian system will be seen, and the picture will show at a glance the immense wealth of the region in these products.

## Signal Service Wanted.

The Board of Police Commissioners of New York City, at their meeting July 26, adopted the following resolution upon recommendation of Commissioner Andrews:

"With a view of selecting a police telephone and signal system for the use of this department, the board invites all persons interested in systems of this kind which have been in successful operation to submit to the board information in regard thereto.

"Such propositions as are made, the board announces, must include a perfect system of electrical and telephone communication between the station house and parts of the precinct; it must be simple of construction and capable of being readily understood and operated, yet be strong and durable and involving all the modern improvements in the line of police signaling.

"Information for the use of the board should first be submitted in written form, accompanied by such drawings and illustrations as may be necessary for a preliminary investigation of the merits of the various systems. Later the board expects to be able to afford opportunity for the practical operation and comparison under the supervision of the officers of this department of such of the proposed systems as are deemed worthy thereof.

"In extending this invitation it is expressly understood that the department has at the present time no fund available for the establishment of a system, or even for experimental purposes. All expense must, therefore, be borne by the parties offering their systems for investigation, and in no event can there be any liability upon the police department."

An adequate police signal system will cost about \$500,000.

## Test of the Gun Lift Battery.

The members of the Board of Ordnance and Fortification witnessed the test of the new gun lift battery at Sandy Hook on August 7. The battery is the first one with a gun lift completed and in operation in the United States and was the first to be officially tested. It forms part of the defenses of Sandy Hook. The battery is composed of two modern twelve-inch guns which are mounted on the new gun lifts, which differ from the Crozier-Buffington disappearing gun carriage heretofore tested, in that they lower the guns some distance below the parapet and are worked by hydraulic machinery, and not automatically by the recoil of the gun. The disappearing carriage, so called, is only lowered a few degrees below the parapet; the guns, which are mounted on the gun lifts, are placed on the top of a conical mound, the sides of which can be swept with rapid fire guns; the battery is worked on the "pair" system, that is, when one gun is being fired, the other of the pair is being loaded below and is raised for its discharge when its mate disappears. In the test ten shots were fired, five from each gun of the pair. After deducting the time lost while waiting for passing vessels to get out of range, the ten shots were fired in about thirty-eight minutes.

In China, "the land of opposites," the dials of clocks are made to turn round, while the hands stand still.



**A Primitive Tobacco Factory.**

China is nothing unless she is primitive, and although the factory which forms the subject of these remarks is not exactly situated in Chinese territory, as it is in the Portuguese settlement of Macao, it is, to all intents and purposes, a Chinese factory, for it is owned and worked by Chinese. The premises comprise several large sheds with earthen floors, and one or two better built rooms, used as storehouses. The factory gives employment to several hundred Chinese men and women. I was accompanied on my visit by Mr. A. A. Pettigrew, a son of Mr. Pettigrew, of Cardiff Castle, who is at present (May) on a tour in the East. The tobacco is not grown at Macao, but at a place called Hoksban, about forty or fifty miles to the northwest of the former town, on one of the numerous mouths of the Sikiang or Canton River. When the plants are properly dry they are done up into bales about 2½ feet long, 2 feet wide and 1 foot deep, and sent down to Macao in junks. On arrival at Macao, these bales are stored in the premises of the factory until such time as they are required for the manufacture of tobacco.

The first room we entered was devoted to stripping the leaves from the stalks, these being discarded in the manufacture. Women, sitting on the floor on their haunches, were busily engaged in this operation when we entered. The sight of us did not distract the women's attention, but several young children who were present on our arrival scampered away to distant corners like mice into a hole. The dust from the tobacco leaves got into our noses and throats and caused us to sneeze and cough, much to the delight of our celestial onlookers, as evidenced by the loud outburst of laughter which followed our discomfiture. Strange to say, we did not hear a sneeze or a cough from any of the Chinese while we were in the factory. After the leaves have been stripped from the stalks, they are carried into one of the sheds in large bamboo baskets by men, then spread on a wooden floor and damped with water. When sufficiently damp they are made up into layers about 2½ feet long, 2 feet wide and 2½ inches thick and placed on boards.

The next process is to make each layer into a solid cake. This is done in the following way: About a dozen layers, with a board 1½ inch thick between each layer, are placed on the top of one another and then pressure is brought to bear upon the whole lot by means of a lever of the second order, in the shape of a thick pole. One end of the lever is fixed firmly with strong ropes, and this constitutes the fulcrum; the weight or the resisting substance is the tobacco, and the power is applied at the other end of the lever by means of stout ropes, which pass round a wooden axle that is securely fastened to the ground.

When the tobacco leaves have been properly pressed, the cakes are taken out and cut crosswise into strips 4 inches wide and the two ends cut off, as they are not sufficiently pressed. The next step is to tie half a dozen of these strips together by means of ropes. The next operation is to make the tobacco ready for use. This is done by means of a plane, very similar in shape to an English carpenter's plane.

The strips of tobacco are stood up on end on the ground and kept in position by boards made for the purpose. As the strips are only about 1½ foot high, the men have to work the plane in a half stooping position, a most uncomfortable way of working from an Englishman's point of view. However, the Chinese do not appear to mind it, as they work away contentedly from morning to night. The shavings of the tobacco leaves are the tobacco ready for smoking. Every man puts his shavings, as he takes them from the plane, into small heaps, weighing about a pound each, inclosing at the same time a ticket with the name of the firm on it in the center of each heap. These small heaps are then put into papers, the two ends of the papers being left open. The packets are then weighed and a little more tobacco is added or taken away, according to whether the packet is too light or too heavy. When the packets are of the proper weight they are put into another paper, both ends closed up and then packed in boxes ready to be sent away.

There is a good deal of order in the way in which the factory is worked. Women are only employed in stripping off the leaves from the stalks, men do all the rest of the work. There is one lot for damping and pressing the leaves, and another batch for cutting the pressed cakes into strips and tying them up ready for planing. The planers only make the tobacco and put it into heaps, a separate lot of men put it into the first papers ready for weighing.

The men who weigh the tobacco pass it on to others who put it into the second paper, and these finally hand it to the packers.

The tobacco is of a dark brown color and is only used, so far as I know, by the Chinese. It has the reputation among them of being a particularly good brand, and the factory is said to be one of the largest in South China. It was very amusing to see the workers at 12 o'clock, as this is the time they take their midday meal. As soon as the clock struck twelve, everything stopped as if by machinery. In less than

five minutes tables were produced from unlooked for corners, basins of rice and other foods were placed upon them, and the men were busily engaged in emptying them by the aid of chopsticks. All the workmen took this meal in the same place as they had previously been working in.—W. J. Tutcher, Botanic Garden, Hong-Kong.—The Gardeners' Chronicle.

**Advancement in Dental Surgery—Implantation of Teeth.\***

Some eight or ten years ago a now famous dentist of San Francisco made a wonderful stir among his scientific brethren by conceiving and performing the operation of implanting a tooth in the jaw of a patient, and by so doing filling a vacant space caused by the forceps.

Since then, after much experimenting and an endless amount of theorizing upon the several subjects of transplanting, replanting, and implanting of teeth, this wise investigator acknowledged that of all his operations in this branch of dental surgery, for one reason or another, he had to expect failure in about twenty-five per cent of his cases.

His method was, after making an incision through the gum, to prepare a socket in the alveolas, or, in the event of its being absorbed, in the maxilla; then the tooth, which had been carefully kept in an aseptic condition, was ligated securely to the contiguous teeth and the patient was instructed to protect it from injury or shock, and to refrain from using it in mastication until a union should take place between the implanted tooth and the bone.

The principal consideration of the old operation was the preservation of the pericementum; and pages of dental magazines and hours of time have been devoted to the vital importance of preserving this membrane, or at least a part of it, as the success in consolidation depended upon its presence.

Now, other dentists, while admiring the success of this "Father of Implantation," commented upon the failures and fell to speculating upon the fact that one case would be a success where success was hardly to be expected, and other cases would fail in spite of every precaution that could be taken.

The principal enemies of the old methods were two—first, complete absorption of the root, and second, a tendency to remain loose in the artificially prepared socket—and it appeared for many years as though the tissues would not tolerate an implanted tooth except under the most favorable conditions, so much so that even to this day there are leading dental surgeons who class this style of operation as unsurgical.

The above objections naturally limited the performance of these cases to the most progressive students among the practitioners of dentistry, and also confined the class of patients to those who would consent to the experiment, or to those cases in which the patient could not grow accustomed to an artificial denture of the regulation pattern.

Through an accidental discovery by a prominent Parisian dentist, the importance of the preservation of the pericementum was completely disproved. This remarkable specimen was a jaw where a deciduous molar had remained in position, being locked securely between the first bicuspid and first permanent molar; its position being such that the second bicuspid was unable to assume its position in the dental arch and remained buried in the alveolas.

Upon the unerupted tooth the traces could be plainly seen upon the roots of the deciduous tooth, they having been first absorbed by the process of development of the permanent tooth; and as the crown could not be dislodged, resorption took place and the remainder of the deciduous roots became a part of the alveolas by becoming solidly soldered to the bone, which led to the conclusion that such an absorbed root will become a part of the jaw, provided, however, that it can be retained in an immovable position until the union takes place.

Experimentation followed, which led to proof of the non-necessity of the pericementum, and also that by a partial decalcification of the tooth root many of the obstacles in the way of the success of the old method would be overcome; as the cellular structure of the cementum is quickly and easily acted upon by the resorbing or soldering action of the bone cells of the maxilla.

Since the truth of the above statements has been clearly proved, by the fact that if such an implanted tooth remains undisturbed for a few weeks it is impossible to extract it as other or natural teeth are extracted, another decided improvement suggested itself to a prominent dentist of San Diego, Cal., which was in the use of roots of teeth alone for implantation, and after the solidification had taken place, attaching a crown of porcelain of proper color, size, and shape to fill the vacancy. It is a well known fact among dentists that no two teeth that have grown in different heads are alike in color, shape, and size, and only about one tooth in one thousand can be used without showing a marked contrast to surrounding teeth.

\* By Dr. D. Cave, of San Diego, Cal. In the National Popular Review.

The method pursued by me differs materially from any of the old plans, and is substantially as follows:

The tooth is first carefully selected for its adaptation to the case in hand. The crown is severed from the root, which is then deprived of its pericementum and shaped to suit the operator.

The nerve canal is thoroughly cleansed and a platina tube is fitted into it, the apex of the root being filled and hermetically sealed.

It is then treated to a bath of boiling bichloride solution, after which it is decalcified by a solution of hydrochloric acid and neutralized with ammonia.

A cap of gold is made to fit the exposed end of the root and to this is soldered a dowel of iridio-platinum; this being secured in position, the root is dipped into a solution of iodosalol and allowed to crystallize.

This is all the treatment necessary. The root being now ready for implantation, a saturated solution of cocaine is used hypodermically to anesthetize the tissues surrounding the site of the proposed implantation, and a section of the gum is removed with a small tubular knife.

The artificial alveolas is prepared, the instruments used being a set of specially prepared bone-cutting instruments, driven by an Edison electric motor at a high speed.

The root is then fitted into place; the entire operation of cutting, drilling, and fitting being accomplished in from five to seven minutes.

After a lapse of from four to six weeks to allow the soldering process between root and alveolas to become complete, the gold cap and dowel are removed and a porcelain crown is attached which has previously been trimmed to articulate with the antagonizing teeth.

The operation, when complete, presents a most natural appearance, both as to color and form, no gold being visible except by very close examination.

One of the incidental features of this process is that the gums adapt themselves to the form of such an implanted root, or at least have a very strong tendency to do so, and will always adhere closely if there is no other opposing force than the new root; whereas, in the old process, all tendencies were toward absorption and shrinking away of the gums, leaving more and more of the tooth root exposed. This has been partially overcome, in some few cases, but the majority of them are as above stated.

The operation as here described is absolutely painless from start to finish, there being no soreness nor pain at any time during or after the implantation.

**Insects Which Are Man's Friends.**

The lady bird, so quaintly marked that it is hard to find two of them just alike, is one of the gardener's best friends, yet hundreds of them are killed because people in their ignorance don't know what a helper they have in this pretty, buxom little insect. A few days ago a writer in the New York Tribune visited a friend who has a garden full of all sorts of flowers, and back of these there is the kitchen garden, with rows of currants and raspberry bushes. The leaves of both these shrubs were covered with blight or lice that were as green as the leaves on which they lived and thrived. Hunting about the bushes were a number of lady birds. The woman in her ignorance was killing these right and left, thinking they were doing all the damage, and when told they were her best friends was incredulous. A few minutes' careful watching, however, showed the small bug busy eating the smaller green pest. Small yellow pyramids showed where she had laid her eggs, which in a day or two would hatch. The woman saw and believed, and in future the lady bird has a sure refuge and a welcome in her patch of flowers and fruit.

Another insect that is forever being killed owing to the ignorance of the general public is the dragon fly, also known as the needlecase. He is one of the most useful insects of this climate. In his larval state he subsists almost entirely on those small squirming threads which can be seen darting about in any still water, and which hatch out into the sweet singing mosquito. As soon as the dragon fly leaves his watery nursing ground, and, climbing some friendly reed, throws away the old shell and flies away, he is helping man again. His quarry now is the house fly. Not long ago the writer saw one of these insects knocked down in a veranda, where he had been doing yeoman's service, and the children and women seemed delighted, although they shrank back from the poor wounded dragon fly. They all thought he had an awful sting at the end of his long body—a cruel injustice. When the writer took the insect up there was general wonderment, which was increased when a captured fly was offered him and he ate it greedily. The boys of that household will never harm a dragon fly again.

**A Ferris Wheel in London.**

The great wheel at Earl's Court, London, built upon the same general plan as the Ferris wheel at the World's Fair, has been completed and was opened to the public on July 6. The top of the wheel is 300 feet above the ground and about 40 minutes are required for a complete revolution.

**The Psychology of a Jury in a Long Trial.\***

Take twelve men from active life, confine them in a court room six hours a day, and expect them to observe closely, remember and reason soundly on the evidence offered, with no guide except some general principles of law and equity. They are also expected to exercise judgment and discrimination of facts that require training in the most favorable surroundings. In reality the ordinary jury is selected from active working men unused to confinement, and unable to think and reason continuously on any topic outside of their everyday life.

They are untrained to discern the probable facts in a contested case, and understand the real from the apparent in the arguments of counsel. The confinement of the court room, its bad, vitiated atmosphere, with the changed diet of hotels in a long trial, make them still more unfit. A grouping of some facts will make clear the purpose of this note. In a recent murder trial seven farmers on the jury were confined five days in the court room and hotel. They all suffered from indigestion, and two of them were ill in bed for some weeks after. One of these men was a Second Adventist, and the counsel referred to the certainty of the sudden coming of the end of the world and the strict accountability of each one, and urged an

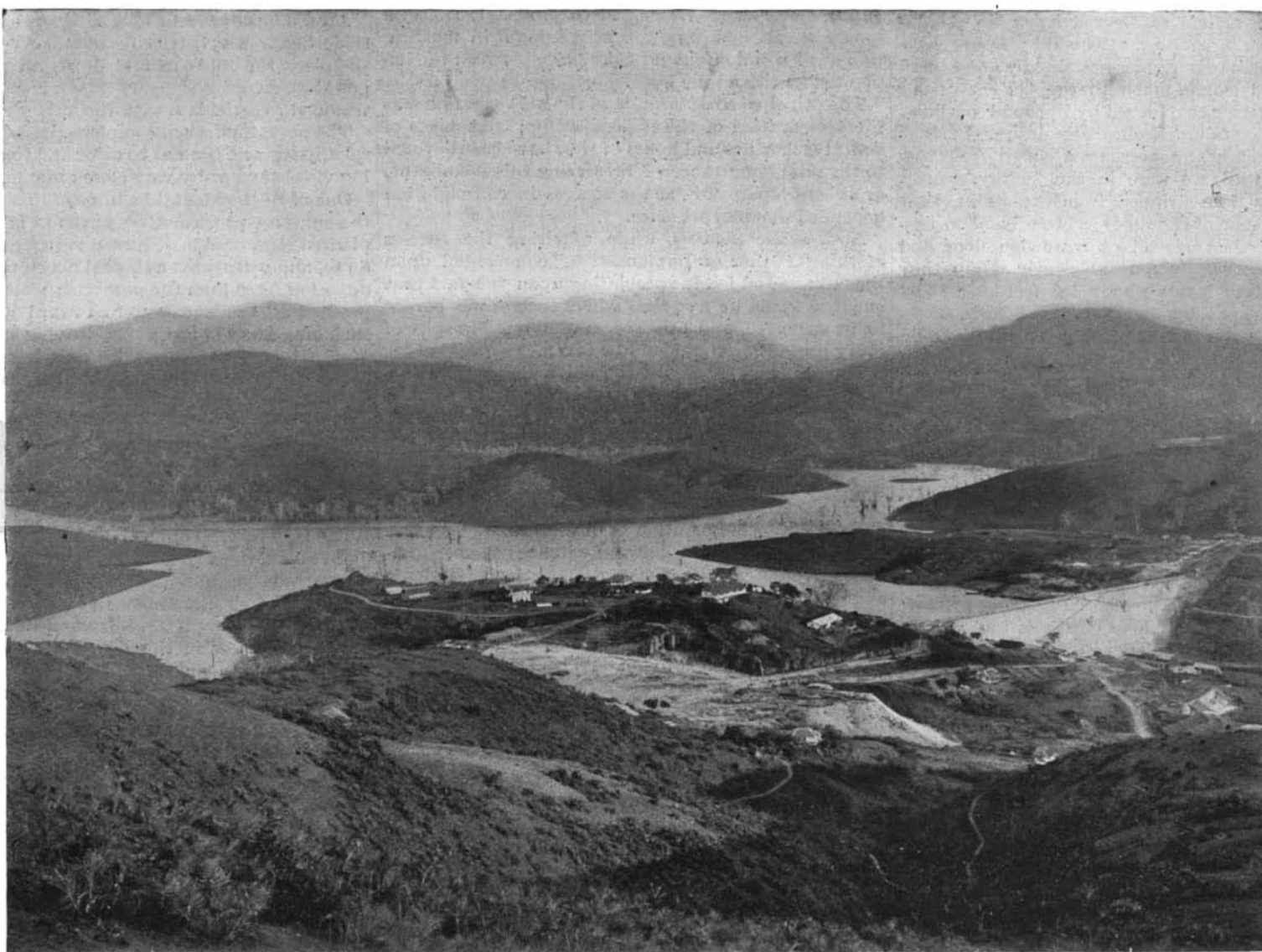
tion in the power this position brings them, and are governed in their judgments by the flattery of counsel. When told they have excellent judgment and will decide in such a way, they follow this advice, evidently. There are always men with a mental "twist" or bias in the average jury. In good surroundings and in good health this would be concealed, but after a day or more in the court room it becomes a dominant factor. Strong religious, temperance and political views intrude themselves, whenever the man becomes at variance with his surroundings, and its natural physical and psychical influences. Lowering and changing the degree of health and functional activities makes him more intolerant of the divergent views of others. After the second or third day of a trial, appeals to these conceptions and efforts to make some facts apply along these lines are always effectual. Emotional, impulsive men, who are controlled largely by the surroundings, are always objects of concentrated interest by shrewd lawyers. In the first part of the trial they are not so influential as later, when the mental status has dropped down; then they may become infused with certain conceptions of the case, particularly for punishment or acquittal. The morals of a jury on a long trial are lowered markedly near the end of the case. If undue influence is used or

**THE GREAT DAM OF THE PERYAR, INDIA.**

The Peryar work is that of turning the water of the Peryar River, flowing westward through the well-watered mountains of Travancore, in South India, eastward through the sterile plains of the Madura district. Six miles west of the eastern brow of the Travancore Mountains the great dam is being erected by which a lake is being formed that is to turn and empty its overflow into a tunnel already cut through the eastern brow, a tunnel 5,700 feet in length by 7½ feet high and 12 feet broad.

The first illustration shows the dam with the lake. So recently has the lake been formed that the partly submerged trees are seen sticking out of the water, some of them still struggling, as it were, for their life.

The buildings on the knoll in the center are the residences of the engineers. The cutting between the houses and the spur of the mountain in the left foreground is to be the water escape when the dam is raised to its intended height. It was a great task to cut that down in the solid rock. The stone taken out has been utilized in the construction of the dam, being carried down to the river bank by a gravity railroad running to the buildings at the foot of the dam and conveyed thence by moving buckets suspended on

**THE GREAT DAM OF THE PERYAR, INDIA.**

acquittal of the prisoner, which was done. The effect of confinement, overeating, and bad, poisoned air, with mental strain to accommodate themselves to the unused requirements of the position, react on the brain, making its operations more unstable and uncertain. After the third or fourth day the judgment of an average juror dwindles into caprice and changeable whims. A certain number will become possessed with a dominant idea concerning the case, which will grow under any circumstances irrespective of all reason or judgment. It becomes literally an "obsession," that is, not changed, although another view may be accepted for present purposes. Others will be thoroughly confused and mentally demoralized, and incapable of coming to any conclusion. The evidence will be a chaotic mass, from which they are unable to extricate themselves. The longer the trial, the more bewildered they become, and at last follow the lead of the majority in despair of anything better. Another class becomes more and more indifferent to the merits of the case, as their physical condition deteriorates; their only interest is to reach the end of the trial; like the former class, they sit listless, neither seeing nor hearing anything with intelligence. At the close they join the majority in any verdict. Another class of superficial, vain men take great satisfac-

if such influences are purchased, the time to do this is when the effects of confinement, bad air, food and derangement of the physical system appear. However honest a jury of average men may be, a change of surroundings and physical vigor will react on their conceptions of right and wrong and strangely incapacitate them. If any of the jury are invalids, or have been confined with dietetic or neurotic diseases in the past, the changed conditions of the jury room are very likely to bring out some entailments of this condition, still further complicating their mental soundness. Pessimistic men who are in ill health are always ready to recognize guilt and inflict punishment in every case. Their ideas of justice are always based on vengeance and punishment. The suspicion of crime is always a reality and evidence to the contrary is deception. Many of these men in excellent physical surroundings would act and reason with fairness, but change the surroundings and degree of health, and they are unsound and unreliable. The psychology of a jury on a long trial furnishes a range of facts that, when understood, the verdict of these men could be predicted with great certainty, no matter what the evidence may be.

PROF. DURAND, in an article in Cassier's Magazine, discusses ship propulsion by storage batteries, and concludes that for the same amount of energy storage batteries at present weigh about 550 times as much as coal and occupy about 220 times the space.

cabies that are stretched from point to point wherever material is needed.

It was at this workshop below the dam that the most serious accident of the whole enterprise occurred.

Mr. Taylor, the superintending engineer, was standing over a large horizontal wheel that conveyed the power from the turbine to the buckets, when a bucket came moving along overhead. To avoid the bucket he moved aside and fell on to the horizontal wheel and was caught and mangled. He lived but a few hours after.

The dam rises from a width of 138 feet at the bottom to 22 feet at the top. Stone masonry on each side, with a solid mass of cement within, is the method of construction. As it rises it is to extend over the hill at the further end until its length will be 1,300 feet. At present the length is about 1,000 feet. The river at the bottom was originally about 300 feet wide.

One of our illustrations shows the top of the dam with the swarms of coolies working on it.

The quantity of water in the dam varies greatly. In the driest months it diminishes to something like 100 cubic feet a second, with occasional small freshets of 1,000 to 3,000 cubic feet a second, of short duration.

During the monsoons it increases to an average of 2,000 cubic feet a second, rising at times to 20,000 or 30,000 cubic feet a second. The largest recorded flood was in November, 1873, during a cyclone, in which 28

\* Read before the Psychological Section of the Medico-Legal Society, Nov. 12, 1894, by T. D. Crothers, M.D., superintendent Walnut Lodge Hospital, Hartford, Conn.—From the National Popular Review.