RECENT MECHANICAL INVENTIONS.

A machine for felting or hardening hat bodies, in which the opposite working faces of the apron and felting roll are provided with rope ribs, has been patented by Mr. J. G. Hecker, of Danbury, Conn.

An improved fastener for window shutters and blinds, which will fasten itself when the blind is swung open, and may be readily unfastened without reaching out of the window, has been patented by Mr. N. P. F. Rosenberg, of New York city.

An improved rolling shade for greenhouses, consisting of a number of slats hinged together, and placed on the outside of the greenhouse roof, so that it may be readily rolled up or let down over the glass by means of mechanism inside the house, has been patented by Mr. Leon Lefébure, of New York city.

Mr. Jonathan Lefller, of Meyerstown, Pa., has patented a nut for securing the bolts of railroad rails or parts of machinery, which, when applied, is locked and prevented from turning backward. It is also capable of tightening itself, so as to take up shrinkage and prevent rattling.

Mr. William T. Doremus, of New York city, has patented an improvement in the oscillating chair for which letters patent No. 161,671 were granted to him April 6, 1875. In the improved form the degree of elasticity of the rubber springs may be readily regulated, so that the tilt of the chair may be adjusted.

An improved clutch, intended for use in connection with the rim of a pulley, hoisting drum, or coupling device, has been patented by Mr. Patrick Fleming, of Fair Haven, Conn. It consists in a hub fitted with radial arms, which are thrown in and out by a wedge-acting sleeve connected with the hub.

An improvement in the class of churns whose box or body is suspended by rods or chains, so that it may be oscillated, has been patented by Mr. Joel T. Hart, of Greenwood, Mo. The improvement consists in the combination of a treadle lever with the suspended churn box.

An improved percussion trap for throwingglass balls has been patented by Mr. Wm. H. Plumb, of Paterson, N. J. In this device a ball-supporting cap is attached to the end of a piston rod, which is thrown up by the successive discharges of cartridges in a revolving cylinder.

Mr. Pardon C. McCune, of Mount Etna, Iowa, has devised an improvement in horse powers which consists in applying a balance wheel to the shaft from which the power is taken, and driving the same by means of cranks and connecting rods from the master wheel of the horse power.

An improved carpet stretcher, actuated by a spring and lever, has been patented by Mr. L. A. Winn, of Carthage, N. Y. This invention consists simply of a bow spring, lever, and link, the spring having at one end a claw for engaging the carpet, and at the other a toe, which is inserted under the edge of the base board.

An improvement in locomotive smoke stacks, consisting in an arrangement of spark and cinder deflectors and a shield for preventing the back draught from exhaust steam and currents of air, has been patented by Mr. John R. Fish, of Grand Rapids, Mich. It is intended to prevent the ejection of sparksand cinders and deliver them back to the stack.

A steam valve, constructed so that the old and worn out seat may be removed and replaced without breaking the pipe joint, has been patented by Mr. Charles A. Bevans, of New Haven, Conn. After unscrewing the guide of the valve stem and removing a nut that retains the valve seat, the latter may be readily withdrawn.

Artificial Ice.

The Boston *Journal of Chemistry* believes that one of the remarkable triumphs of science and art as developed in this progressive age is seen in the devices for producing artificial ice in large quantities. It is claimed, and not without reason, that, so perfect has the apparatus become, ice can be formed on the shores of any of our northern lakes and rivers at less cost than that necessary to the cutting and storing of natural ice in winter. One of these interesting devices in operation on the shore of the St. John's River, Florida, last winter, afforded the writer ample facilities for observing its work from day to day, and testing its capabilities. It was of the class in which ammonia is the agent employed to produce refrigeration, and well known as the arctic machine. It was found capable of "turning out" ten tons of ice daily, in the form of blocks about two and a half feet long and ten inches in thickness. The congelation was perfect, and the product met with a ready sale at the hotels and private residences, not only in Jacksonville, but at all the points on the St. John's River. The price of Nothern ice in Florida previous to the introduction of the machine was from ten to fifteen dollars a ton in moderate quantities; the artificial ice is sold at five dollars, and thus a powerful and successful competitor to the ice companies sprang up at the door of their depositories. The dealers resisted and ridiculed the "machine" for a considerable time, but in the end it triumphed, and prices were reduced. The actual cost of manufacturing ice in Florida is not far from seventy cents a ton, and this includes the storing and delivery. It must be known, however, that fuel in Florida costs almost nothing. The ice company have only to haul the waste lumber from a steam sawmill, fifty rods away, to be used as fuel, and it is supplied gratuitously.

The principle upon which the machine acts is the same as that which every housekeeper adopts in freezing creams in summer. When solids are changed to liquids, a large amount of heat is absorbed, and surrounding objects must supply it; if the liquid is volatilized, or changed to a gaseous body, still larger supplies of heat are demanded. Thus, if caustic ammonia, which in its natural condition is a gaseous or aeriform body, is subjected to powerful pressure it changes to a liquid, and in doing so is forced to give up a large amount of latent heat. If it is relieved of pressure it again becomes aeriform, and as it demands a large amount of heat it seizes it from all bodies in contact. If water is in contact it is robbed of its latent heat and becomes frozen, and thus ice is formed.

In the arctic machine about fifty pounds of liquid ammonia are stored in a very strong iron cylinder, and this is connected with a coil of pipes immersed in a tank of strong brine; into this brine galvanized iron cans holding pure water are placed, and these cans are of the size of the blocks of ice which are formed. The liquid ammonia is allowed to flow through these coils, and it gradually becomes gaseous, and in becoming so abstracts from the water so much heat that it speedily freezes. A powerful steam pump forces the gaseous ammonia back into the iron cylinder again, thus liberating great heat, which is disposed of by cold water dropping upon coils of pipes through which the ammonia passes on its way to the condenser. The process is a continuous one, and if the pumps and coils do not leak there is no loss, and the operation may go on so long as the machinery lasts. The apparatus and the scientific principles upon which it acts are very interesting, and we are convinced that at present there is no hindrance to securing abundant supplies of ice, at cheap cost, in any tropical country where fuel is abundant and of low cost.

Iron Industries of Leeds.

The machine trade of Leeds is at the present moment, like most other English industries, in a state of depression. The productive power of the various foundries and machine shops, however, is greater than ever; and when the tide of prosperity turns once more in their favor, the canopy of smoke will settle with all its old density over the woolen metropolis, and the furnaces will blaze, and the hammers and anvils will clang, with all their ancient force. It is marvelous to observe to what a position the iron industries of Leeds have risen in such a short space of time, yielding large and rapid fortunes to the leading men engaged in them, and almost elbowing the staple trade of the town into a condition of secondary importance. It is one of the traditions of the district that iron works existed in Leeds and the neighborhood in the time of the Roman occupation, and the monks of Kirkstall are credited with having added iron working to their other pursuits; but it was not until the Murrays, the Fairbairns, the Kitsons, and other artificers in iron entered upon the scene that Leeds came properly under the rule of Vulcan. These men not only enriched themselves, but enriched the town, developing to the general profit of the community the valuable mineral resources of the district, and giving the world the advantage of their many mechanical discoveries. It was never dreamed at the beginning of the present century that such a possibility of development existed within the boundaries of Ralph Thoresby's native town. There were in 1871, 99 collieries existing in the Leeds district alone; the total number for Yorkshire being 423. In the same year there were in the Leeds and Bradford district 13 iron foundries, containing 247 puddling furnaces, and 59 rolling mills. The great industrial activity and immense resources which these figures represent are in wonderful contrast to the picture which could be drawn of the condition of things half a century ago; and whether England is destined to retain its industrial pre-eminence or not, the history of the men who were mainly instrumental in building up the nation's industrial greatness will always remain among the most attractive and most instructive evidences of a progress that is as yet probably the mightiest achievement of human effort.—*London Society.*

Country Schools.

A writer in *Barnes' Educational Monthly* discusses intelligently the importance of common schools and the difficulties encountered by teachers in inducing regular attendance and the maintaining of uniformity of text books. Another difficulty, complains the writer, arises from a mania among a certain class of farmers for acquiring all the land that joins theirs. Indeed it becomes a species of insanity, and from it men seldom recover. This is the way it works: So soon as a man, by scrimping and scraping, has saved a few hundred dollars, he bargains for the farm adjoining his, and makes the first payment, giving a mortgage for the balance. Now, for years he must scrimp and scrape even more closely, to pay off that mortgage. No sooner is this accomplished than the process is repeated; and so on, till death ends his work.

Meanwhile, his family is denied every comfort, his wife is a slave, and his children are growing up little better than heathens. Not that the father means to be unkind or neglectful, but he is "so poor"—land poor, always with a mortgage hanging over him, always with big interest and big taxes to pay. His home cannot have books and pictures, for these cost money, and he has none to spare; nor flowers, and the thousand dainty devices which make home attractive, because the overworked mother has no time nor heart for such things; and so the eternal grind, grind, grind, of their life goes on, without a particle of brightness to illumine it. . . .

Now for the effect upon our public schools. Such a man frequently becomes the heaviest tax payer in the district. Through the renters upon his various farms he often controls votes enough to turn the scale in the district election. Now, he has himself and a colleague like unto him elected directors. Do you need to be told what such a board will do? Poor school-houses—for why should he care more for the school-house than for his home?—no apparatus, short terms of school; the cheapest of cheap teachers—one who will work twenty-six days for a month, "same as farm hands"—become the rule. Or, if this man does not reach the dignity of school director, he still has a controlling influence in district affairs, and that influence is all in favor of a penny-wise, pound-foolish policy.

The effect upon his own children is no less disastrous. They do not attend school regularly, because they are kept out to work whenever a possible five cents can be made thereby. They are seldom supplied with necessary books, for these cost money, and the money must go to lift the mortgage. They have no enthusiasm for study, for the atmosphere of their home smothers it. And the great danger is that these children will grow up to curse the world with multiplied copies of their father.

American Products in England.

The *Agricultural Gazette*, published in London and devoted, as its title implies, to the farming interests of Great Britain, suggests that he would be a bold man who should venture to deny that American competition is the great nightmare of every English producer. Not merely in the abundant surplus of "prairies bounded by the setting sun," but also in many minor articles (to the perfection of which human skill and labor enters), the toe of America galls Britannia's heel.

English bacon curers, cheese dairymen, and butter makers have long been dolefully complaining that their ordinary make is driven out of the shops by importations from beyond the Atlantic. A London builder recently stirred half the Black Country to wrath by stating in the *Times* that his customers preferred American locks. One day it is the vision of fleets entering Liverpool with cargoes of fresh meat and live cattle, which drives a section of Englishmen half wild. The next, the Kentish fruit growers see with horror the demand for the finest Blenheim oranges and Ribston pippins encroached on by "Baldwins." While those most self-satisfied of all Britons (the breeders and turfites of Newmarket and Epsom) have just had a wholesome pill to swallow in witnessing the triumphs over the best English and French horses of Papoose and of Parole.

It is impossible that this well-nigh universal success of our closest rival can be accidental. There must be a reason—some motive, universal there, but less active here—which brings our cousin Jonathan in so often as a winner. Defeat should be healthful, if its causes be discreetly examined. It cannot be merely soil and climate which work this miracle. For, into some of the American triumphs soil and climate do not enter. Nor can it be always the extra burden of taxation here which turns the scale against us. Because, in several of the wins recorded, the labor (which is the most expensive factor in the production) costs more there than the same would cost here.

It is not of the least use, as British farmers unwisely prefer to do, grumbling at the Legislature for not doing something in this case to redress the balance and to bring back good times. It is quite plain that some at least of the causes of our defeat are, to no small extent, inherent in ourselves; in our ways of conceiving and of carrying out our work.

The American thinks nothing too small not to be worth looking into, and the ingenuity and thoroughness with which every secret of nature is probed and is recorded are beyond all praise. We, on the contrary, are so satisfied that the methods we inherit are not only the best now, but the best ever to be discovered, that we do not care to do more than to inquire, "what is the old way." Indeed not a few farmers resent as an insult the suggestion that they have anything to learn. To follow a precedent is the Englishman's one idea. Yet, as the problem offered to farmers is continually changing (for new items have constantly to be taken into account, and as relative values are continually being altered) the way to solve this problem successfully is by no means to go on copying the old figures. If cheese and butter are to pay the maker, they must now be the best of their kind, because, whatever may have been the case once, customers now have a choice, and they choose the best: having once had the best they will not take inferior. If cattle are to pay the vendor, these, too, must be of the best. And it is only common sense to say there ought not to be so many middlemen to claim a share out of the final price.

Shad in Arkansas.

Seven years ago a lot of little shad were placed in the Ouachita river, which rises in Arkansas, flows into Louisiana, and empties into the Red river in the latter State. Nothing was seen of them for a long while, and most people had forgotten the experiment, when two years ago two or three stray shad, the first that had ever been known in that region, were caught. Last year between thirty and forty were taken, and this spring they have been caught in immense quantities in Arkansas, in the vicinity of Hot Springs. This shows that there is no reason why the fish should not be domesticated in the far South, and the New Orleans papers call upon the people along the rivers in that region to stock them with young shad.

The Treatment of Neuralgia.

Aconite is an old remedy in neuralgia, which has, however, not altogether realized the expectations which were formed of its value. The power which it often lacks has been lately claimed for its alkaloid by Professor Gubler, who announced that aconitia is almost infallible in trigeminal neuralgia. This substance was long banished from the materia medica for internal use, but it has been employed occasionally since the discovery of a crystallized form by Gréhaul and Duquesnel in 1871. Its value in neuralgia has lately been investigated by the New York Committee on Neurotics, of which Dr. E. C. Seguin is the chairman. The dose of all forms of aconitia is about the same, the initial dose being about half a milligramme ($\frac{1}{100}$ grain) twice or thrice a day. Gubler states that the dose of amorphous aconitia may be gradually raised to half a centigramme, but Duquesnel's preparation has to be given with greater caution. There are, however, differences in susceptibility, and some persons cannot bear a larger dose than $\frac{1}{200}$ of a grain; while one case was met with in which $\frac{1}{64}$ of a grain every three hours was tolerated.

From a trial of the treatment in a series of cases, the committee conclude that, on the average, distinct physiological and therapeutical effects may be obtained by giving $\frac{1}{100}$ of a grain three times a day. Of six cases of severe trigeminal neuralgia, one, probably a reflex neuralgia from a decayed tooth, was not at all benefited. Three cases of epileptiform neuralgia were slightly or only temporarily relieved. Two cases were cured. One of these had existed for seven years, with an interruption of seven months, procured by resection of the affected nerve. The results thus afford a partial support to M. Gubler's assertion.

The value of ammoniacal sulphate of copper in the treatment of the same affection has been asserted by M. Féréol in a recent communication to the Académie de Médecine. He states that in cases in which every treatment has failed, even the administration of gelseminum and of aconitia, a cure or remarkable relief may be obtained to the most severe symptoms by this drug. Among the examples he gave of its use was the following: Trifacial neuralgia of two months' duration, with absolute (?) insomnia, was unrelieved by the extraction of teeth, quinine, bromide, aconitia, or tincture of gelseminum, hypodermic injections of morphia, or arsenic. From the first day of the administration of the ammonia sulphate of copper there was a notable remission in the symptoms and cessation of the insomnia. In one case the dose was pushed to eight grains without any other accident than nausea. It has the drawback of occasioning a persistent metallic taste in the mouth. Only one case of intolerance was met with; in that a grain and a half of sulphate of copper occasioned violent vomiting.—*Lancet.*

Chinese Physicians.

According to the *National Medical Review*, when the Chinese physician examines the pulse, he places the arm of his patient on a cushion; then he applies the index, the middle and ring fingers on the anterior face of the wrist in such a way that the index finger may be nearest the arm, and the ring finger nearest the hand. The physician then elevates and depresses each finger, alternately, with more or less force, like one playing on an organ. They examine, also, during a limited number of respirations, each of the nine pulses, which are formed, according to their doctrine, on each hand, and they deduce from these their prognosis, at once, without hesitation; make their prescriptions, and attend to administering their medicines on the spot; receive the fee and retire, not to return unless again summoned.

The Chinese physicians imagine a multitude of odd connections between the viscera of the human body and the elements, the seasons of the year, the stars, colors, etc. The heart, they say, is analogous to fire, to the planet Mars, to summer, to spring, and to southern climes. It comes from the liver, begets the spleen and the stomach, is antipathic with the kidney, and receives no injurious influence from its contact with the lungs.

During the springtime the pulse is like a tense cord; in summer it is more developed and becomes exuberant; in autumn it appears as if floating; in winter it is rather quiet.

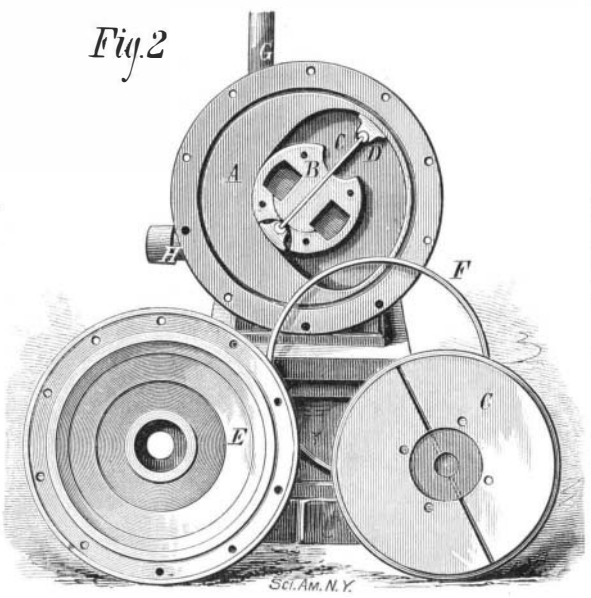
They think that the spirits and the blood, both vehicles of heat and humidity, run through all parts of the body in twenty-four hours. This daily circulation, they say, commences in the lungs at 3 o'clock in the morning, and ceases next day at the same place and at the same instant. The knowledge of the canals through which this is effected constitutes, in the eyes of Chinese physicians, the fullness of anatomical knowledge.

They count six canals which pass directly from above downward, and an equal number which return from below upward; eight canals run transversely, and fifteen obliquely.

A NEW ROTARY ENGINE.

The construction of rotary steam engines has received the attention of many of the best engineers and mechanics, with results that have usually proved anything but satisfactory. However, it is claimed by the manufacturers of the engine shown in the accompanying engraving that, after having several of them in use at their own factory and in various other places, they are satisfied that it is practical and that it must for many uses supersede the reciprocating engines.

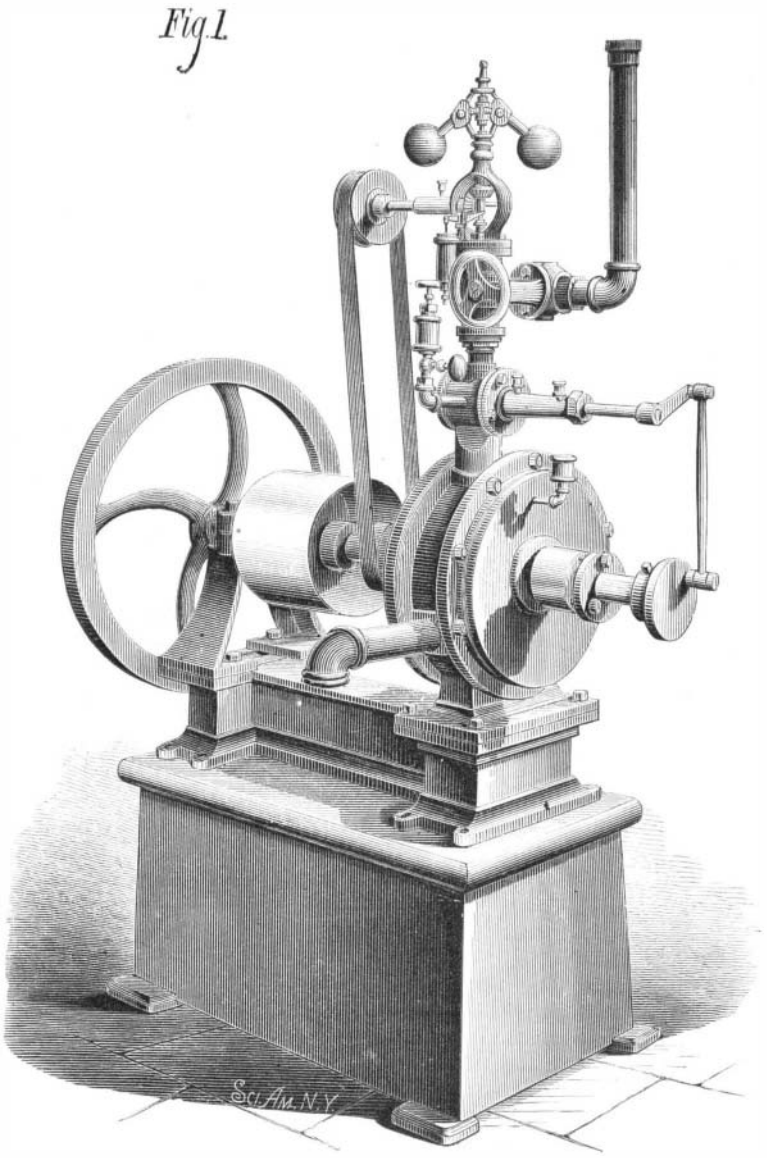
The case, A, contains cams and abutments, and the cylinder, B, has attached to it the heads, C C, which rotate with



ROTARY ENGINE.

it when the engine is in motion. The blade, D, is provided with packing saddles or shoes at each end. The cylinder has packing rings, F, and the outside heads, E, are recessed to admit the cylinder heads, C, and are bolted to the case in the ordinary way. The cylinder, B, and the rotating heads, C C, are slotted for the accommodation of the blades, D. Steam being admitted at the steam port, G, forces the extended end of the blade around to the exhaust port, H; before reaching this point, however, the blade passes up the cam, and is shifted endways through the cylinder, B, so that when the upper end of the blade, D, reaches a position in front of the port, G, the expanded steam is exhausted through the pipe, H, and the motion is continued as before, the blade passing around the inside circle of the case, A, and up through the cylinder, B, as it moves forward. The packing rings are placed in a suitable groove in the case, and are pressed against the cylinder heads by means of steam which is admitted through a small passage extending from the steam port to the back of the rings. The saddles at the ends of the blades are attached to the blades by means of a knuckle joint which allows them to adjust themselves to any angle of the wearing surface of the case; the pressure when at work, always keeps them packed against the case, so that the wear of the saddles or case is taken up and a perfect steam joint always maintained. The cut off, as shown in Fig. 1, is a novel feature in this rotary engine; as the steam is exhausted but twice to a revolution, it is perfectly practical, and may be set to cut off the steam at a third or half the stroke, as may be desirable, thus utilizing the expansive force of the steam. One notable point in this engine is the absence of springs or any kind of soft packing. The manufacturers state the joints are so well protected that there is no possibility of the escape of steam until it has done its work.

This engine is the invention of Mr. Alonzo Noteman, of Toledo, Ohio, and it is manufactured exclusively by Messrs. D. E. Saltonstall & Co., of the same place.



NOTEMAN'S ROTARY ENGINE.

Legal Practice in London.

In the legal profession in England there are three distinct and well defined branches of practice; and the boundary lines of the several spheres of enterprise may not be overstepped. The solicitor transacts ordinary business, and advises his client, both as to the avoidance and the redress of grievances. He asserts the rights of the layman who intrusts his interests to his keeping, and avenges the wrongs inflicted upon him by others, so far as these functions can be performed with the aid of the ordinary appliances which the law affords. When matters become more complicated than the simple remedies will suffice to cure, the solicitor seeks the aid of counsel. The client cannot go directly to the latter to the prejudice of the general practitioner at law; nor can counsel transact ordinary business for laymen, however willing they may be to pay his fees or secure his services. An opinion may of course be obtained on the most trivial subject, but the case must be submitted through a solicitor, or counsel cannot entertain it, so that the wider professional interests are duly protected. There is a still more exclusive class of practitioners, who act solely as consultees and leaders—the Queen's counsel—who are prohibited from appearing in most cases before the courts without a junior. By this simple but effective organization of labor, any unseemly conflict of aims and interest is prevented, and the public benefit, not less than the profession, by the arrangement made and carried out.—*Lancet.*

New Pigment Process for Enlargements.

The *Association Belge de Photographie* publishes a pigment process by Dr. Van Monckhoven, which is especially adapted to solar enlargements. He dissolves wax in benzine, charges a small quantity of cotton with the solution, and applies the latter to a light piece of plate glass. The plate is then provided with a coating of collodion or varnish, and then immersed in water for thirty minutes. It is then taken out and placed flat upon a table, where it is coated with a mixture consisting of a colored pigment, gelatine, and bichromate of potassium, which having become firm, the plate is allowed to dry in the dark. In place of this (in addition to this) Monckhoven usually takes pigment paper, sensitized in the usual manner by dipping in a solution of bichromate of potassium, places it upon the collodionized surface of the plate—previously moistened with water—rubs it down in order to obtain perfect adhesion, and finally leaves it to dry. The plate is then exposed in the solar camera (enlarging apparatus) by allowing the picture rays to act, through the plate, upon the film treated with bichromate. The exposure is regulated by the assistance of the photometer. The plate is subsequently immersed in warm water of 30° for fifteen minutes, then in water of 60°, after which the sheet (paper) is detached, and the picture developed in the usual manner. It is then fixed, and a piece of white gelatine paper is finally affixed to the picture by means of the roller. When this has become perfectly dry, the picture is detached. If white gelatine paper be used, which is very brilliant (glossy), the picture will retain its smooth appearance even if it is mounted on cardboard. If, on the other hand, dull looking gelatine paper be employed, the picture will have the appearance of any ordinary print obtained by single transfer. Relative to this process, Monckhoven declares the exposure of the pigment film as adhering to the plate to be essentially new. The following advantages are claimed:

1. The net-like appearance of the pictures and the spontaneous insolubility of the chromo-gelatine will be avoided.
2. A perfect evenness (uniformity) of the paper, and a greater durability of the same, are obtained.
3. All drawbacks of the single transfer process, as imperfect adhesion, air bubbles, and other casualties well known to persons using the pigment process, are successfully avoided.
4. The resulting prints remain perfect, and the pictures are clear and sharp beyond comparison.