

determined pressure has been reached in the receiver, E, by exhausts from the high pressure cylinder, as shown in Fig. 1. The engine thus starts with steam in both cylinders, and automatically changes at a certain receiver pressure, so as to work on the compound principle.

The engine may be changed from the compound system to the simple system at any time at the will of the engineer, by opening a valve connecting the receiver with the exhaust pipe, and allowing the exhausts from the high pressure cylinder to be ejected through the exhaust nozzles in the usual manner.

The apparatus is so constructed that the operation of the exhaust valve permits steam at the receiver pressure to enter into the space, h, to insure the movement of the piston to the position shown in Fig. 2, before the receiver is emptied through the exhaust. This prevents a lapse of continuous action in the low pressure cylinder during the change from the compound to the simple system while running. It is obvious that under bad conditions of starting the engine may be operated as a simple one, at the will of the engineer, by opening the exhaust valve before starting. Whenever this valve is closed, the piston, a b c, will automatically take the compound position shown in Fig. 1.

It is also obvious that an engine of this kind makes but two exhausts into the air, when running as a compound, for each revolution of the drive wheels, instead of four, as usual.

This engine is the second of the kind, the first having been placed on the Brooklyn Union Elevated road more than a year ago, since which time it has been working satisfactorily and with great economy of fuel and oil, besides running with much less noise and without throwing cinders and sparks. Since the large engine here shown was built, the Rhode Island Locomotive Works have changed two more of the simple engines of the Brooklyn Elevated road into compound engines, and have built one new compound engine for the Kings County Elevated road. They have also built a large ten-wheeled compound engine for the Jamaica Railway Co., to run on the island of Jamaica, and six very heavy freight engines of the four-cylinder type of compound, for the Mexican Central Railway of Mexico.

The large engine which we illustrate was designed for making fast time on trains with few stops. It has been used on the New York, Providence & Boston Railroad between Providence and New London, in general service on heavy and fast trains. By a comparison with simple engines of practically the same dimensions every way, it has been found that in point of cleanliness, that is, freedom from cinders and black smoke, the compound engine is in marked contrast to the simple engine. In fact, it has been found that this engine needs no netting at the front end. It will thus be seen that this engine settles the question of the cinder and smoke nuisance. Although the bearings or journals are of ordinary size, none of them on this engine have ever exhibited any signs of heating, thus showing that the stress on the reciprocating and revolving parts is more regular than in the simple engine exerting the same power.

The builders of the engine place the saving of fuel on a conservative estimate from 15 to 25 per cent of that required for a simple engine. This is certainly a surprising gain, and one which would seem to indicate that we are to see in the near future a revolution in the construction of locomotives.

Compression of the Carotid for Convulsions.

Dr. Leopold Roheim, of Budapest, publishes in the Gyogyaszat a case of eclampsia which he had, after the failure of all ordinary remedies, successfully treated by compression of the carotid. The case, which is quoted by the Pester Medicinisch-Chirurgische Presse, was that of a robust man of fifty-six, who had been suffering for years from cancer of the bladder, with occasional hæmaturia. The man had been attacked by a most violent eclamptic paroxysm, which was mainly confined to the left side. Dr. Roheim prescribed in vain musk, valerianate of zinc, bromide of potassium, asafœtida, hypodermic injections of morphia, enemata of hydrate of chloral, and frictions with mustard, and at last employed compression of the carotid. After constant compression for some time of the right carotid the convulsions were suddenly arrested, the patient recovered normal respiration, and very soon felt quite well. Two or three slighter attacks followed, which were soon arrested by properly instructed attendants. The effect of the compression was so remarkable that Dr. Roheim earnestly recommends this treatment. He compressed the carotid with the index and second fingers between the larynx and sterno-cleido-mastoid muscle backward toward the spine, just as Trousseau and Bland had recommended. He was equally successful in the case of a girl nine years old. He considers the rationale of the treatment to be that by compressing the carotid and at the same time necessarily the sympathetic nerve fibers, which closely follow the course of the artery, the excitability of the brain is allayed.—Lancet.

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For the Week Ending February 20, 1892.

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Table listing contents of the supplement with page numbers, including I. AGRICULTURE—Agricultural Use of Thomas Slag, II. BIOGRAPHY—Jacques-Louis Lagrange, etc.

RELATED INVENTORS.

By the terms of the existing law the official fees for a patent are fixed at \$35, payable in two installments; the first, \$15, on filing the application for the patent; the second, \$20, after the application has been officially examined and favorably passed upon or "allowed."

The applicant has six months time, after the allowance, within which to pay the final fee of \$20. If not paid, the application is forfeited, and the only way then to obtain the patent is to file a new application and pay a new government fee.

Many inventors are poor, and are obliged to search for financial aid. As a rule, they are not good business men. They often postpone the final payment as late as they can, sometimes even up to the last hour. If living at a distance, the mail may be delayed and not reach Washington until after the business hour of the Patent Office; or the telegram may fail to arrive in time.

When the money comes to hand, after the official closing hour of the office, it has heretofore been customary for the applicant's agent to place the funds in a sealed envelope and hand it, at the door of the Patent Office, into the custody of the watchman in charge; who in turn passes it over the next morning to the official receiving clerk.

These payments, although made after office hours, are still made within the six months time allowed, and have been accepted, heretofore, as a technical compliance with the law.

Two cases of payments in this manner were lately brought to notice of Commissioner of Patents Simonds, in one of which the \$20 fee was delivered to the watchman five minutes before midnight and the other four hours prior to midnight. The Commissioner refused to recognize the legality of the proceeding and the matter was sent to the Secretary of the Interior, and by him reported to the Attorney-General's office for an opinion. Assistant Attorney-General Shields decides adversely to the inventor, on the following grounds:

Section 4885 of the Revised Statutes provides as follows:

"Every patent shall bear date as of a day not later than six months from the time at which it was passed and allowed and notice thereof was sent to the applicant or his agent, and if the final fee is not paid within that period the patent shall be withheld."

Section 4985 provides as follows:

"Patent fees may be paid to the Commissioner of Patents, or to the Treasurer, or any of the assistant treasurers of the United States, or to any of the designated depositaries, national banks, or receivers of public money designated by the Secretary of the Treasury for that purpose, and such officer shall give the depositor a receipt or certificate of deposit therefor."

"The law, however, points out the specific officers authorized to receive such payments, and none other has any authority to act in the premises."

"It is in effect claimed that payment may be made to any officer or employe of the government, and this in the face of the specific provisions of law as to the places and persons, where and to whom such payments are to be made. The mere statement of the proposition without comment or argument is sufficient to show that it cannot be seriously entertained."

"It is further alleged that it has been the practice, well understood by those interested in the matter, to accept fees handed to the watchman at the door of the interior department building, as these fees were, after office hours or upon holidays, and to credit them as paid on the day they were handed to such watchman. There is no authority for such a practice, and if it has been allowed, the sooner it is discontinued the better. The policy of allowing any employe not under bonds to become a receiver of money is a dangerous one and should not be countenanced, even though it be not forbidden by the law."

"As a legal proposition, the decision of the Commissioner that this payment was not one under the law is, in my opinion, entirely sound."

"The law," says the Attorney-General, "points out the specific officers authorized to receive such payments, and none other has any authority to act in the premises."

This cannot mean that the receiving officer must personally stand at the counter and take money; but he may provide clerks and assistants to do it for him.

Furthermore the patent law expressly authorizes the Commissioner of Patents to make, subject to approval of the Secretary of the Interior, such lawful rules for doing business with the Patent Office as he thinks proper.

It is, therefore, within the sphere of the Commissioner to make a special arrangement to accommodate related inventors and save them from loss of standing on the records, and from the forfeits and extra costs, if they should happen to reach the Patent Office after the customary closing hour.

In his recent annual report to Congress, Commissioner Simonds stated that the Patent Office receipts last year were over one hundred and thirty-one thousand dollars above the expenses; and that a little over four millions of dollars were now standing in the

treasury on account of the Patent Office fund, all of which was paid in by inventors. In the same report the Commissioner dwells at considerable length and with much eloquence upon the immense benefits conferred upon the country by patentees. Among other things, he says:

"There is no class or condition of men in the whole country which has not felt the blessings of American inventive genius, fostered into its fullest flower by wise and kindly patent laws."

As coincident with these generous sentiments we hope the Commissioner will do something practical by way of relief for the belated inventors. The effect of his recent ruling has been to drive them from the doors of the Patent Office, without remedy.

By a few strokes of his pen and without detriment to others, he can make a new and kindly rule that will assist them.

It is not asked nor to be expected that the Commissioner will personally remain at his office until 12 o'clock at night to receive fees; but it seems not an unreasonable request for inventors to make that he will authorize the expenditure of five hundred or a thousand dollars a year for the employment of a clerk whose special duty shall be to be present at the door of the Patent Office from 4 P. M. (the usual closing hour) until 12 o'clock P. M., for the express purpose of saving cases that must otherwise be forfeited. If this is not desirable, then some other way surely ought to be provided to receive the anxious applicants' money, if presented even so late as the fraction of a second before the limit of time specified in the law.

**EXCLUSION OF PHOTOGRAPHS FROM THE INTERNATIONAL POSTAL EXCHANGE.**

Mr. Herbert Spencer, during his last visit to this country, felt called upon to speak to us some pessimistic yet wholesome words of caution relative to our intense love for the least permanent but most showy advances in social government. Yet, quick to see the good in us, he spoke most hopefully of that phase of our life which both enabled and impelled the man in the middle walks to surround himself with those literary, musical, and art luxuries which still remain far out of the reach of most Europeans. In his trip through the United States, during last year, the Earl of Rosse gave it as his opinion that the most observable manner in which the American citizen was differentiated from the subjects of European powers was in the way in which he was able to live; the appearance of solid comfort, even luxury, with which it was possible for the artisan, for example, to surround himself. As the chief cause contributing to this condition, beyond that of the boundless wealth of our territory, he recognized the great inventive and resourceful qualities of "the Yankee mind"—qualities that keep busy a small army of experts and their clerical forces examining, classifying, and passing upon a multitude of improvements in mechanisms and processes such as no other country can show.

To electricity, with its glittering triumphs over time and space, and to steam, with its boundless energy, are usually given the dual honors of first mention when this century's advance in material prosperity is under consideration. The more regular and far more constant progress made in the graphic arts is generally overlooked in this discussion; yet in no way are we today further removed from the life of the early part of this century than in our improved facilities for enjoying, in our own homes, the reproductions of the earth's chief art treasures, or of nature's beauty and grandeur. The wonders of the Yellowstone, the dread gloom of the trackless African forests, the terrors of the Alaskan avalanche, the untrodden sublimities of the upper Himalayas, are brought to our library tables, and we commune with the powers of nature, thus shown forth with almost the same sense of mental elevation which our actual presence among them would produce. To-day we may, if we will, become more familiar with the racial characteristics of face and form of the man of the Kilima-Njaro mountains, or the Patagonian wildernesses, than were our grandfathers with those of civilized Europe. To the camera and all that troop of following processes which have so improved and, at the same time, cheapened the reproductive graphic arts, are we mainly indebted for these enrichments of our library tables, our book shelves, and our walls.

Anything which is calculated to take from the public the immediate benefits accruing from such progress, a progress in which America has borne a prominent part, or any governmental action or restriction which shall add to the difficulty or cost of enjoying the educative results thereby brought about, is an unmixt evil. So when Mr. Secretary Foster, of our Treasury Department, promulgated his recent order excluding photographs from the mail exchange, a blow was aimed at one of the sources of public culture.

This ruling of the secretary is based on the provisions agreed upon by the Universal Postal Union Convention, as quoted in the *General Regulations under the Customs and Navigation Laws of the United States*, 1884. Article 308, which reads as follows:

"The sending by mail of letters or packets containing gold or silver substances, pieces of money, jewelry, or precious articles, or any packets whatever containing articles liable to customs duty is prohibited."

Article 310 of these regulations provides for the admission of books "to the International Mail Exchange, and imported through the mail under the act of March 3, 1879," but only books are therein specified. The secretary's contention is that the previous admission of such articles, now so long permitted, has been illegal, and he has instructed his assistants at the various ports of entry that only "on payment of a fine equal to and in lieu of the duty which would have accrued thereon had importation been legal" can such a package be delivered. If Secretary Foster be right, and the respectable line of his predecessors have permitted an infringement of law in the past, then the time is ripe for bringing the matter before the present Congress. A slight amendment of the law, to wit, the insertion of two words, "and photographs," after the word "books," would be greatly to the advantage of the people.

**The Production of Aluminum.**

Taking into account the development made by the factories of aluminum in recent years, it may well be believed that the production almost equals the demand, although new uses for this light but ductile metal are being daily discovered.

The *Bulletin de Musée Commercial*, in a recent number, reviews the productive capacity of the principal aluminum factories now in operation. Since the closing of a large number of European works, by reason of the difficulty they experienced in competing with the electrolytic process, the manufacture of aluminum is at present confined to four large factories. The most important is the Aluminum Industrie Actien-Gesellschaft, at Neuhausen on the Rhine, the daily production of which is about 1,000 lb. of metal. Then comes the Pittsburg Reduction Company, with a daily production of 600 lb.; the Metal Reduction Syndicate, Limited (English branch of the Pittsburg manufacture), with 300 lb. daily; and finally, the Cowles Company, which has a daily production of from 600 lb. to 700 lb., but of which the greater part consists of alloys of aluminum. It is thus seen that the present production of aluminum in the world only amounts to about 2,600 lb. daily.

Hitherto the largest quantity of commercially pure aluminum seen at one time consisted of a stock of about 19 tons, to be found recently in the warehouses of the Pittsburg Reduction Company. Then may be mentioned, in order of importance, the Paris Aluminum Company, which ceased its operations at the commencement of 1890 with a stock of 10 tons; the Alliance Aluminum Company, of Newcastle, and the Aluminum Company, Limited, of Birmingham, which possessed, at the time of the closing of their works, stocks of 8 and 6 tons respectively.

Toward the middle of last year American aluminum was quoted at the rate of \$2 per lb.; some few months later the price was reduced to \$1 per lb. The present prices of the Pittsburg Reduction Company are: For No. 1 quality, 90 cents per lb. in small quantities and 75 cents per lb. for orders of at least one ton; for No. 2 quality, of a purity of from 94 to 97 per cent, 65 cents per lb. for quantities of not less than a ton.

On the other hand, it is stated that a French company has just erected an establishment at St. Michel (Savoy) for the manufacture of aluminum by the Minet process. This process is based on the electrolytic treatment.

**The Real Inventor of Telegraphy.**

According to a writer in the *Popular Science Monthly* for February, Weber was the first who established a permanent workable telegraph line, and thereby demonstrated the practical value of the electric telegraph. Weber's house in the city was connected with the astronomical and magnetic observatories by a line between three and four kilometers (over two miles) in length. The signals were made by the deviations of the needle of a galvanometer to the right and left, and were interpreted according to a conventional alphabet. The use of interrupted or reversed currents did not permit the transmission of more than one or two words a minute, but the speed was increased to seven or eight words by the use of induced currents. The following first notice of this telegraphic connection was published in one of the numbers of the *Göttingen Gelehrten Anzeigen* (or *Göttingen Scientific Notes*) for 1834: "We cannot omit to mention an important and, in its way, unique feature in close connection with the arrangements we have described [of the Physical Observatory], which we owe to our Professor Weber. He last year stretched a double connecting wire from the cabinet of physics over the houses of the city to the observatory; in this a grand galvanic chain is established, in which the current is carried through about nine thousand feet of wire. The wire of the chain is chiefly copper wire, known in the trade as No. 3. The certainty and exactness with which one can control, by means of the commutator, the direction of the current and the movement of the needle depending upon it

were demonstrated last year by successful application to telegraphic signaling of whole words and short phrases. There is no doubt that it will be possible to establish immediate telegraphic communication between two stations at considerable distances from one another."

**Electrical Tanning.**

The *London Boot and Shoe Trades Journal* describes the results of two experiments in tanning by aid of electricity, by "Groth's system," carried out at the tannery of George Hauenstein, at Verviers, Belgium:

The apparatus used in these experiments consisted of a rectangular wooden vat, 6 feet 6 inches long, 4 feet 10 inches wide, and 5 feet 3 inches high, with two electrodes, framework and shafting, the cost of which was £30 7s. 6d., together with a dynamo, ampere meter, volt meter and shafting, costing £24; or, altogether, £54 7s. 6d. This electric installation is capable of supplying electricity to six vats or pits.

Forty ox and cow hides from the Brussels abattoir were experimented upon, weighing, without the horns, 1,380 kilogrammes. These hides, after having been put in lime, unhaired and fleshed, were swelled and colored. The forty butts derived from these hides were hung up in the vat on the 12th of October and taken out on the 16th of November; they were subjected to the action of electricity during four weeks, or twenty-four days, from six to seven hours per day, and the weight yielded, when finished and dry, was 379 kilos.

The offal, bellies, throats and heads, hung up in the vat on the 16th of November, were taken out on the 7th of December. The parts were, therefore, subject to the action of electricity during three weeks, or eighteen days, from six to seven hours per day, and the weight yielded, when finished and dry, was 344 kilos.

The forty hides, therefore, with a green weight of 1,380 kilos., gave a total weight of finished leather of 723 kilos., or 52.4 per cent.

The tanning material employed to swell, color, and tan these forty hides was as follows: 880 kilos., of oak bark, costing 15 francs per 100 kilos., equal to £5 5s. 6d.; 85 kilos. of mimosa bark, at 40 francs per 100 kilos., equal to £1 7s.; 400 kilos. of oak extract, at 40 francs per 100 kilos., equal to £8 8s. This makes a total of £13 6d. for tanning 723 kilos. of leather, equal to 45.2 centimes per kilo., or 2 1/4 d. per pound of leather.

The *Journal* adds:

At the Crystal Palace Electrical Exhibition there is much to be seen of great interest, but to us and our readers nothing of more interest than attaches to L. A. Groth's exhibit of various kinds of leather tanned by the aid of electricity. Mr. Groth's interesting exhibit consists of diagram of "complete tannage" in fourteen days of "green hides," each averaging 77 pounds weight, showing their daily absorption of tannin from the liquor, ascertained by analyses made on samples taken from the hides and liquors every two hours during the whole time of the tannage, and showing that as soon as the hide has been tanned, no more tannin can be absorbed by it, even if kept in the liquor for ever so long.

Another diagram shows the comparative tannages, viz., with and without the aid of electricity, and demonstrates not only that electricity bears an important part upon the hastening of the tanning process, but also distinctly shows to what degree the electricity so acts.

As to the products exhibited by Mr. Groth, there are several "sole butts" tanned by him in four weeks. The color is good, the leather firm, and the finish very clear. To further show the quality of this leather, several pairs of boots made from the same are exhibited. An old pair of boots is also exhibited, with the right sole made from Groth's one month's tannage and the left from leather tanned in eight months by the old process, and constantly worn for six months by a person said to weigh 12 stone, in order to show the small wear of Groth's leather, as compared with first-class leather—the wear being equal in both.

There are some calfskins tanned in fourteen days.

The belting made from Groth's leather, tanned in four weeks, seems also to be of first class, and the very samples tested by Professor W. C. Unwin, F.R.S., of the Central Institution, London, are also exhibited, in order to demonstrate their peculiar breakage, being in a straight line, whereas the ordinary belting generally breaks raggedly, which says a good deal for the uniform tannage of Groth's leather. Professor Unwin also says, in his report: "The leather generally is quite up to the strength of good leather intended for belting," and "the tenacity in this per inch of width of Groth's belting, as compared with English, is as follows:

	English.	Groth's.
Maximum.....	1,272	1,318
Minimum.....	616	848
Mean.....	964	1,002

We would advise our readers to have a look at Mr. Groth's exhibit, which will doubtless prove not only interesting, but instructive and valuable from a trade standpoint.