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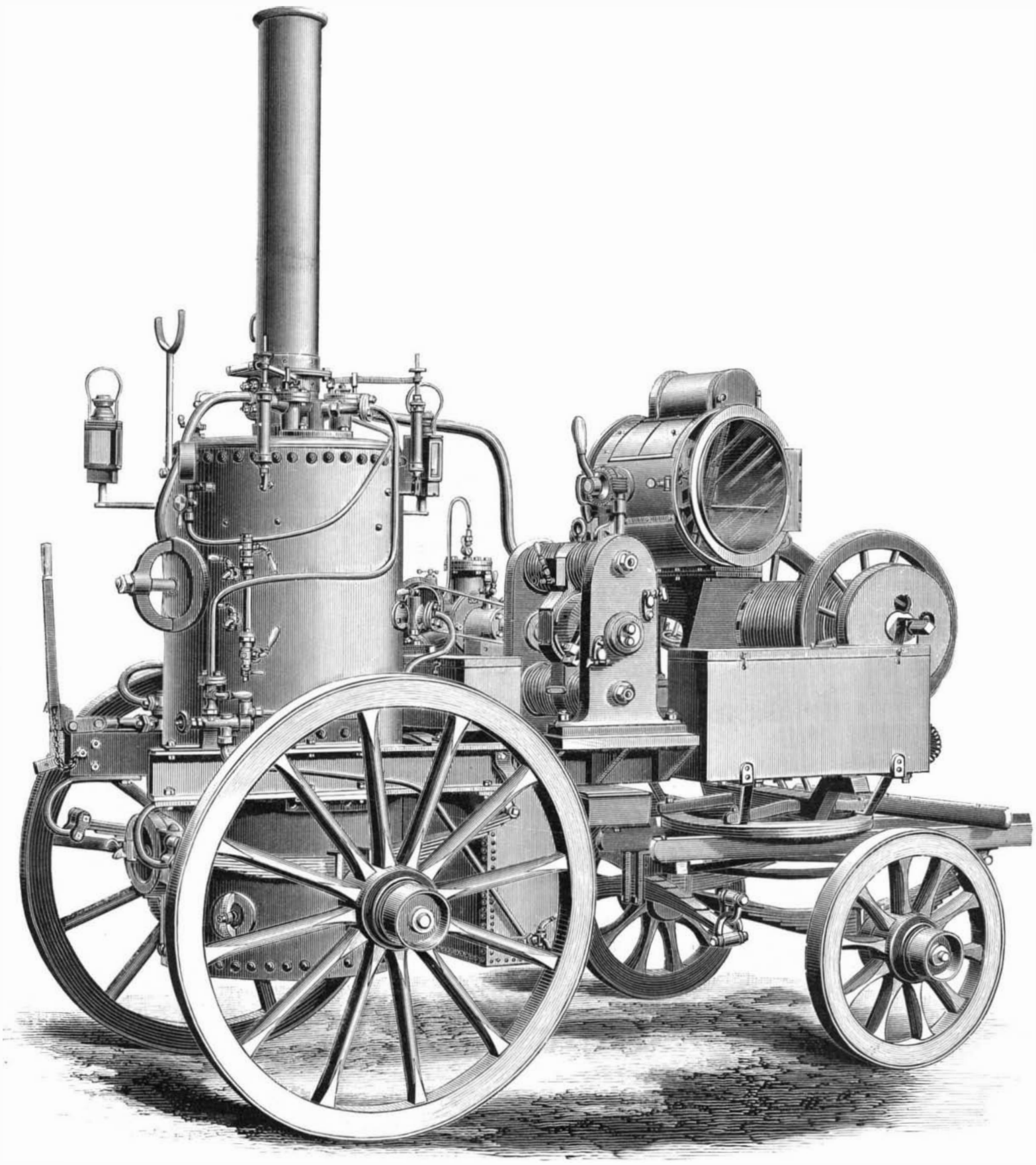
ELECTRIC LIGHTING FOR SIEGE PURPOSES.

It is extremely useful for the defenders of besieged places to be able at night to illuminate the accesses to the fort, since the enemy generally profits by darkness to undertake his sapping operations and to effect those movements of troops that are necessary to make an assault or attempt a surprise. So, from all epochs, the endeavor has been made to illuminate the country by throwing projectiles composed of materials that are inflammable but of slow combustion. Sometimes these projectiles were held aloft by means of a parachute with which they were provided, and which unfolded itself after a certain length of time; and, sometimes, they were allowed simply to drop on the ground. But, in the latter case, the assailants among whom they fell naturally hastened to extinguish them or to roll them into some ditch. This is the reason that the fire bombs employed at the present day by the artillery are provided internally with a grenade designed to explode at the moment combustion is about ended and to wound or kill soldiers who approach it. The imperfections of such a process will be readily understood. The projectile, being very light, cannot be shot to any very great distance, and the light that it emits is quite rapidly extinguished after lighting up an extent of ground which, at the best, is comparatively small. For this reason, an effort has been made for several years past to utilize for the purpose the electric light, and to form therewith a powerful luminous fascicle capable of being directed at will to different points in such a way as to sweep the entire surface of a sector. Parisians will recall the installation made at the Moulin de la Galette of an apparatus of this nature, which was illustrated in all the journals of that epoch (winter of 1870–1871).

Unfortunately this invention, in all its novelty, did not yield very great results, for the illuminating power was insufficient, the range of the luminous fascicle was too limited, and the mechanism employed was too cumbersome and costly. If these first arrangements had been retained, it would have been necessary to adopt a small number of stations and to make them permanent.

In order to make an application of electric lighting for the defense of our fortresses (and, as well known, France possesses, and is at present constructing, numerous intrenched camps, forts, etc.), it became necessary to effect great improvements in the machines employed. The economical aspect of the question had to be taken into consideration, and there had to be obtained also a sufficient portability in the sources of electricity and light to make up for the numerical lack of *matériel*, and to allow of the range of illumination being increased by displacements of the machine or of the lamp.

The use of the Gramme machine has permitted the carriage for carrying the apparatus to be made considerably lighter. In outer forts, and even for the needs of a campaign, a single carriage carries both the generator of electricity and the



PORTABLE ELECTRIC LIGHTING FOR SIEGE PURPOSES.

lamp. The latter is not fastened to the carriage, and can be removed by a couple of men and carried to any culminating point in the vicinity, while the vehicle remains where it is. The projecting apparatus is set up on a folding support which opens and closes in the form of a sort of lattice work.

The engraving given herewith represents the type adopted for the French army, which at present possesses light apparatus of the kind. One of the apparatus was shown at the recent exhibition of electricity by the Minister of War, and another by the house of Sautter & Lemonnier.

The projector, which was devised by Colonel Mangin of the French army, is 40 centimeters in diameter. The Gramme machine gives a light equal to 600 Carcel burners. The apparatus thus arranged permits of the exploration of the country to a distance of 2,400 meters, and even of three kilometers if the weather is sufficiently clear.

There was also exhibited at the Palais de l'Industrie another type designed for forts of the first category, but on the same system. This was experimented with for a long time at Mont-Valerien, and it was found that an observer standing alongside of the apparatus could see objects located at a distance of more than six kilometers, and distinguish details of construction at five kilometers. With so great a power as this, it is naturally necessary to employ less portable machines than those above mentioned, and the projecting apparatus and the generator of electricity have to be carried on separate carriages.

We shall now briefly point out the peculiarities of these two essential parts.

What constitutes the originality of the Mangin projectors is the form of the mirror. It is well known that in order to reflect the rays diverging from a lamp into a fascicle of parallel rays, it is only necessary to place the lamp in the focus of a parabolic mirror. Now the construction of parabolic curves is difficult and expensive, so Col. Mangin conceived the idea of employing glass cut with two spherical surfaces, thus facilitating the labor. These two spheres must not be concentric; and calculation permits of finding the degree of eccentricity with which the ray, emanating from one of the centers, is sufficiently parallel in practice (though not geometrically so) with the diameter which joins the two centers to give the fascicle all the power desirable. It is easy to verify the fact that the convex surface has a greater radius than the internal cavity; or, in other terms, that the thickness of the metal in the center is less than at the edges.

A biconvex lens, interposed between the luminous focus and the reflector, diminishes the focal distance, and, consequently, permits of reducing the dimensions of the projector.

Col. Mangin likewise employs a *dispenser*, the object of which is to spread out horizontally the fascicle obtained—height being of slight importance. It appears that this arrangement has been somewhat criticised, as it diminishes the intensity of the light produced. "The projectors being movable," say the adversaries of this system, "their field may be extended, without any loss of illuminating power, by a simple displacement."

Let us now pass on to the source of electricity.

The Gramme machine, adopted in France, Russia, and Norway, is actuated by a three-cylinder engine on the Brotherhood system. The electro-magnets are flat and very wide, and the bobbin has two current collectors. The elements may be coupled for tension or quantity by means of a commutator mounted on the machine, and the changes may be effected instantaneously.

When the electro-magnetic parts of the machine are coupled for quantity, it revolves at the rate of 600 revolutions per minute, with an expenditure of a power of four horses, the light produced varying from 1,000 to 1,200 Carcel burners. When coupled for tension, the machine revolves with a velocity of 1,200 revolutions per minute, with an expenditure of eight horse power, and gives a light equal to 2,000 to 2,500 burners. With such a power, and by the use of projectors 90 centimeters in diameter, ordinary writing may be read at a mile distant, as has been shown by experiments made at Berlin in 1875. By placing in front of the regulator a mirror inclined toward the horizon it has been found possible to project on the clouds a luminous band which, from a distance, looked like the tail of a comet, and on which (as on the screen exposed before a lantern) exhibited themselves such signals as were made in front of the mirror.

There is thus realized, then, a system of optical telegraphy in which the Morse alphabet is employed as a means of correspondence.—*Revue Industrielle.*

Verdict of the Coroner's Jury, Jewells' Mills Explosion, Brooklyn, N. Y.

"We find that Levi J. Stevens came to his death on the 16th day of February, 1882, by the explosion of two boilers belonging to the Jewell Milling Company. We believe and find that the sole responsibility for said explosion rests upon the Hartford Boiler Insurance Company; and we hold said company responsible for the death of Levi J. Stevens, in giving permission to the Milling Company to carry an amount of steam which the age of the said boilers did not warrant, and which, in the jury's estimation, said boilers were unable to carry. We are of the opinion, and recommend, that boilers be tested in the future by both the hammer and hydrostatic test."

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THE SCIENTIFIC AMERICAN SUPPLEMENT,

No. 325,

For the Week ending March 25, 1882.

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PROPOSED AMENDMENTS OF THE PATENT LAWS.

Elsewhere will be found the text of a bill (H. R. 4,949), introduced in the House of Representatives, March 6, by Mr. Morgan R. Wise. Most of its features are highly commendable.

The first clause aims to prevent fraud upon "innocent purchasers of patent rights" by making it the duty of intending purchasers of such rights to take reasonable precautions against being cheated; such precautions as any intelligent business man would be sure to take, or would regard himself foolishly careless if he did not take.

This clause strikes at the root of much of the complaints against the patent system. Men who stupidly or with criminal intent purchase alleged patent rights without investigation should blame themselves and not the Patent Office when their ventures prove unprofitable. They have no right to pose as innocent victims of the law, or to besiege Congress for relief from their folly at the cost of honest inventors and patentees.

The latter part of the section provides a fine not exceeding $1,000, or imprisonment not exceeding three months, or both, for fraud in the selling of patent rights by the use of forged or altered patent specifications, claims, or drawings.

The second section of the bill provides corresponding penalties for fraudulent patent sales, wherein the seller pretends to convey rights or privileges which have previously been disposed of, wholly or in part, to others.

Section 3 is designed to facilitate the work of the Patent Office, and enable it to comply with the terms of the law without antedating or reallowing patents the final fees for which are paid at the end of the six months' limit.

Section 4 makes it possible for the owner of a properly assigned patent to obtain a reissue without the signature of the inventor, who has ceased to be a party in interest.

Section 5 makes the life of an American patent absolute, and not as now contingent upon the life of any foreign patent upon the same matter which the inventor or another may have taken out. This is a proper and very desirable provision.

Section 6 contains two provisions, both commendable. The first is that a reissued patent shall not cover any machine or article the production of which was begun during the existence of the original patent, but not subject to it. When an inventor omits to claim what he might properly have claimed in a patent, it is fair that he be allowed to correct the oversight within a reasonable period; but it is not fair to allow him to make the correction the means of dispossessing or restraining another in an industry lawfully begun. The latter part of the section provides that the surrender of a patent for reissue shall not cause any forfeiture of rights which had accrued under the patent previous to its surrender.

Of the forepart of section 7 we cannot speak so favorably. It fixes a price for the *Patent Office Gazette* to American subscribers very much lower than its actual cost, and provides a higher rate for foreign subscribers. The office would receive no benefit from this discrimination, for the simple reason that the foreigner would buy through an American agent. The purpose of the diminished price is to diffuse mechanical knowledge and encourage invention. The diffusion of knowledge is no part of the function of the Patent Office; the encouragement of invention is; but the method prescribed by the Constitution for the carrying on of this desirable work does not include the publication at a loss of *Official Gazettes* or any other literature, however valuable or useful.

The proposed reduction in the price of copies of patent specifications, claims, drawings, and related matter seems to be entirely reasonable. If incorporated into the patent laws the first section of the bill would create a largely increased demand for such papers, and the prices named would appear to be ample to cover cost.

The sections of the revised statutes which section 8 would repeal relate chiefly to the extension of patents granted prior to March 2, 1861—sections which expire by natural limitation this year.

The provisions of this bill, with the single exception noted, are so well calculated to "amend" the patent laws in the best sense of the word, that its early passage is much to be desired.

In place of the objectionable portion of section 7, we should be glad to see a clause making it the duty of the Commissioner of Patents to provide in the Patent Office better facilities for an examination of its records. The records are intended to be, and to a great extent are, open to public inspection; but in the absence of special provision for such work it is practically impossible for an inventor, an intending purchaser of patent rights, a manufacturer, a student of any department of invention, or other citizen, to make an examination of the records of the office that he can be sure is complete and thorough.

What is needed is a room or rooms set apart for the purpose indicated—a place where the searcher could have brought to him for examination copies of every record relating to the subject he is investigating; a room provided with complete indexes of all the records of the office, in charge of attendants able to aid and advise the searcher, as a competent librarian aids the searcher for special information in a great library.

Something of this nature would be of great public utility, and the need of it must increase with time and the rapidly accumulating records of the office. The patents in many departments are now so numerous that even at the low price