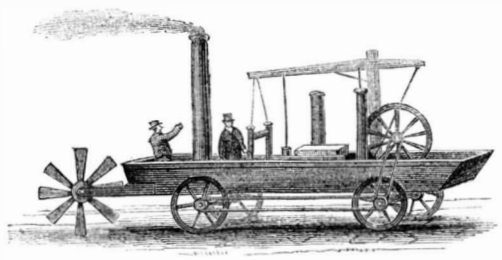
ROMANCE OF THE STEAM ENGINE.

ARTICLE XX.

OLIVER EVANS.

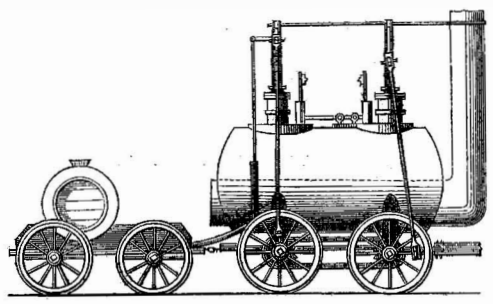
From the investigations of the subject, which we have made, we are perfectly convinced that Oliver Evans was the inventor who designed and constructed the first appropriate boiler for generating high pressure steam, and also that he was the first person who really appreciated the value and advantage of using steam at a high pressure. When we consider what has been accomplished by the employment of light, powerful engines—such as locomotives, carrying very high pressure steam—the name of Evans deserves a very high place on the scroll of fame. In an able and elaborate article, by Oliver Evans Woods, published in the Philadelphia *Evening Journal*, on the 1st of June, 1859, it is stated that in the year 1794 Oliver Evans sent Joseph Stacy Sampson, of Boston, to England, with drawings and specifications of his high pressure cylindrical boiler and engine, for the purpose of securing a patent in that country, but, for some cause not explained, it was not obtained for some time afterward, but the drawings had been exhibited to several English engineers. It was not until the winter of 1804, we believe, that he carried his ideas fully into practice. His boiler was cylindrical, with a flue through the interior, and in the front end of which was placed the furnace. The engine which Evans used was nearly similar to Watt's; it had four puppet valves for the cylinder, operated by cams, an arrangement which has been adopted for the most approved engines now in use in some steamboats and factories. Evans applied his engine to a mill for grinding plaster-of-paris, but the first real value of high pressure steam seems to have been obtained in applying his engine to drive a gang of saws. It is stated, in R. Stewart's work on the steam engine, that Evans found that in working ten saws, when the steam employed was at a high pressure, the engine drove the whole gang as easily as one saw was driven by the same engine worked by low pressure steam; in the former case there was a slight excess in the consumption of fuel. It is also said that his boilers were built for steam of from 50 to 150 pounds pressure to the inch. Evans also passed his exhaust steam through a small vessel containing water, to heat it previous to its being fed into the boiler—an arrangement now quite common on high pressure engines. The strong cylindrical boiler and the feed water heater were great improvements, and they laid the foundation of success in the high pressure engine—a success which led to the introduction of the locomotive and the railroad system.

The accompanying engraving represents Evans' "Oruktor Amphibolos," which was planned in 1803, and constructed in the course of the following year.



He had applied to the Legislature of Pennsylvania, in 1785, for a patent on a steam wagon, but the committee to whom his petition was referred considered him insane. The Board of Health of Philadelphia, however, being more rational, furnished him with capital in 1804, to build an engine for dredging the docks. To show that it was capable of propelling land carriages, digging mud, and driving vessels, he built the Oruktor Amphibolos. Evans was a cranky yet genial man, and enjoyed a good joke. As a rivalry existed between him and Col. John Stevens, of Hoboken, N. J., in the inventive line, he astonished the colonel with the name as well as the construction of this ancient Philadelphia dredger. It consisted of a large scow with an engine of five-horse power on board, to lift the mud into punts. Wheels on wooden axles were put under it, and by means of chain belts, connecting the wheels with the engine, it transported itself from the place where it was constructed to the Schuylkill river—a distance of a mile and a half—where the paddle wheel was secured to its stern.

The second figure represents Evans' engine and boiler applied to drawing wagons on railroads. The sketch is taken from "Gregory's Mathematics," republished by Carey & Hart, Philadelphia, in 1848. The description in that work refers to an engraving represented on page 461 in "Stewart's Anecdotes of the Steam Engine;" we therefore infer that this locomotive is something of a fancy sketch. It has the cylindrical boiler; two working cylinders are secured



to its top, and the furnace is in front of the flue which runs through the interior of the boiler. It has a smoke pipe, valve boxes, and carriage springs. The wheels are yoked together by an endless chain. Each piston rod is connected with a crosshead on the outer end of which, on each side, is the long rod extending down to the crank pin on each wheel; there is the feed pump which takes the water from the tank to the boiler.

Evans also proposed to employ a combined engine for carrying the products of combustion from the furnace, mixing them with the steam, and working them in the cylinder. He also used a blast for the furnace of his engine, so that he was long in advance of some projects which are thought by many to be novel in the year 1861. Respecting the benefits which Evans conferred upon the world, Robert Stewart, in his work before referred to, says:—"The practice of Evans and his publication on the subject, the first which was professedly of a practical nature, has produced a general impression in favor of using steam of a high temperature in North America; and by thus dispelling the vulgar prejudice which still exists against its use, in England, the foundation has been laid for the introduction of improvements on a principle which is yet thought to be capable of a great and beneficial extension."

So far as we have been able to ascertain, Evans never built a steam carriage that went into practical use, but he proposed to do so, and showed by the carriage which he moved through Philadelphia that this was practical, and he predicted that steam engines would be running on railroads after he was laid in the grave; this actually took place.

Inventors live in happier times now than they did sixty years ago, when Evans secured patents for valuable inventions. He was robbed and cheated out of them, and was harassed and ill used by the very people who should have honored, respected and rewarded him.

At 60 years he conceived the talent of invention had departed from him, and in 1819, when he had reached the age of 64, death closed his eyes. Oliver Evans was born at Newcastle, in the State of Delaware, but spent the greater part of his life in Pennsylvania. He was fertile in invention, had a good common education, was of an athletic form, and possessed open and frank manners.

AN inspection of the bones of Charlemagne took place at Aix-la-Cbapelle the other day. The remains were found in excellent preservation. Careful photographs were taken of the wrappers in which the remains of Charlemagne had rested for so many centuries; they were of a beautiful silken tissue. The larger wrapper, rich in color and design, was recognized as one of those *draps de lit* which were frequently mentioned by the Provençal troubadours, as well as by the cotemporary German Minnesangers, as *Palia transmarina*, *P. Saracenica*. It is, no doubt, a product of industry of the Sicilian Saracens from the twelfth century. The second small wrapper, of a beautifully preserved purple color, has been traced to Byzantine industry; the Greek inscriptions woven into the silk texture make it probable that the stuff was manufactured in the imperial gymnasium at Byzantium, in the tenth century.

Photographing Stars.

The following interesting remarks on this subject are condensed from the communication of a correspondent to the London *Photographic News*:—

Photographing the moon is a laborious undertaking, affording full occupation for one observer, who must pay unremitting attention to the condition of the various chemicals employed, so as always to be prepared for a cloudless night.

There are certain peculiar difficulties attendant upon photographing celestial objects, arising from the apparent motion of the objects. The photographic picture can never be so perfect as the optical image, with the same telescope, until we can obtain photographs of celestial objects instantaneously. If a fixed telescope be presented to a celestial object, the star will, in consequence of the earth's rotation, course along the field of the telescope, in a line parallel to the earth's equator; the image obtained is therefore a streak, representing the path of the star. We might suppose that this streak would, for short distances, appear straight and continuous; but it is broken up and distorted, and consists of a great number of undulating points, crowded in some places, and scattered in others. This distortion arises from disturbances in our atmosphere, which cause the star to flicker.

If the telescope be mounted so as to follow the star's apparent path, the picture obtained after some seconds' exposure, is not one single clear disc or point, but a conglomeration of points extending over a greater or less area, according as the atmosphere has, during the interval, produced more or less flickering.

The reflecting telescope has considerable advantages over the refracting telescope for celestial photography, on account of all the rays coming to a focus in the same plane; hence, the focus having been adjusted for the luminous image, it is correct for the chemical image also. Refracting telescopes can, however, be specially corrected for the chemical focus, in the same way as camera lenses.

Stereoscopic pictures of the larger planets may be obtained by allowing a sufficient interval of time to elapse between the taking of the two pictures. In the space of 26 minutes Jupiter will have rotated through the 15° 48′ necessary to produce the greatest stereoscopic effect. In 69 minutes, Mars would have rotated through the same angle, and as his markings are very distinct, we may hope to obtain stereoscopic views of that planet. The markings on the other planets are too faint to hold out a promise of similar results.

Perfection in lunar photography would result from the employment of Lord Rosse's large telescope. The size of the pictures of the moon taken by Mr. De la Rue is about $1\frac{1}{16}$ inches in diameter; these might be enlarged by means of an adaptation of the solar camera; impressions 8 inches in diameter have already been obtained in this manner; and if the lenses lately produced by Mr. Dallmeyer be employed, still greater enlargement might be obtained without any sensible distortion.

It will surprise many of our readers to learn that, although we have a full moon every month, a full moon is never visible to us, except just before or just after a lunar eclipse, or, at all events, except when the sun, earth, and moon are very nearly in the same plane; at all other periods of the full moon, we are unfavorably situated for seeing the whole of the illuminated hemisphere. This phenomenon, and that of the different apparent diameter of the moon at various times, dependent on her distance from the earth, come out prominently in a collection of lunar photographs. At the moon's mean distance, the pictures taken with Mr. De la Rue's reflector measure 1·0137 inches, the variation being from 1·0053 to 1·1718.

Stereoscopic pictures of the moon are obtained by combining two views taken at sufficiently distant periods. The light and shade in the photograph do not, in all cases, correspond with the light and shade in the optical picture. The reason is, that portions of the moon equally bright, optically, are by no means equally bright, chemically. Frequently, details are rendered visible photographically, which escape observation optically, and this fact is full of promise for future selenological researches. By the aid of photography we may reasonably hope to obtain a more perfect map of the moon than now exists. The

mass of curious details already displayed by photography is quite overwhelming. The relative actinic power and luminosity in the planet is remarkable. In the occultation of Jupiter by the moon, on November 8, 1856, Jupiter appeared of a pale, greenish tinge, apparently of about one-third of the general brilliancy of the moon; but the actinic power of Jupiter's light was subsequently found to be equal to fully four-sixths or five-sixths that of the moon. Saturn required twelve times as long as Jupiter to produce a photograph of equal intensity on an occasion especially favorable for making the experiment.

Electrified Locomotives.

Upon the Miss. & Milwaukee Railroad they have a locomotive in use that has become so thoroughly charged with electricity, as to give the engineer or firemen severe shocks, whenever they handle certain parts of the machinery. The first indications of this peculiarity were noticed in November, since which time the volume and force of its electric power has been constantly on the increase. Now when it stands upon the side track or is blowing off steam, the current of electricity flashes along the scale beam, and over the tops of the cab, while the report at times is as loud as that of percussion caps; at the same time throwing out globules of iron, something larger than ordinary shot, and at night the lightning flashes along the works in a manner that astonishes all beholders.

The company have 16 other engines of the same make, and it is possible the others may assume this same remarkable condition. In this event, and in case the "Farm Mortgagor's League" attach the equipments of the road, as they intimate in their Annual Address, it will only be necessary to open the valves, and let loose the bolts of Jove, and the showers of hot shot, to defend the equipment of the road from all depredation.—*Western Railroad Gazette.*

[The electricity in these cases must be set free by the steam issuing through the safety valve, and thus the locomotive becomes a hydro-electric machine. The most powerful known discharges of electricity have been obtained from a steam boiler.—Eds.

Saws for Cutting Timber.

Four different classes of saws are employed for sawing out lumber. These consist of the circular, the muley, the gate saw (all single), and the gang saw.

The circular saw cuts during its entire revolution, and it can therefore saw a great deal more lumber in the same space of time than a reciprocating saw. More power is undoubtedly required to operate them, but not in proportion to the greater amount of work done, when compared with a log saw. The muley is a stiff, long saw, not stretched in a gate; it is run at the rate of 300 strokes per minute, or nearly double the speed of gate saws. Muley saws are preferred in many places to all others, but they waste timber. A much thinner saw, however, than the former can be used in a gate, because it is stretched and held firmly to the work independent of its own weight.

There are two classes of gang saws; one is called the "flat" and the other the "round gang." The logs are first slabbed on two sides by separate saws for the flat gang, and the logs are laid flat upon the bed. The boards and planks come out of such a gang finished. The logs are fed without slabbing to the round gang. The boards thus produced are afterward trimmed at their edges by small circular saws. By this latter method of sawing, a greater quantity of valuable timber is saved.

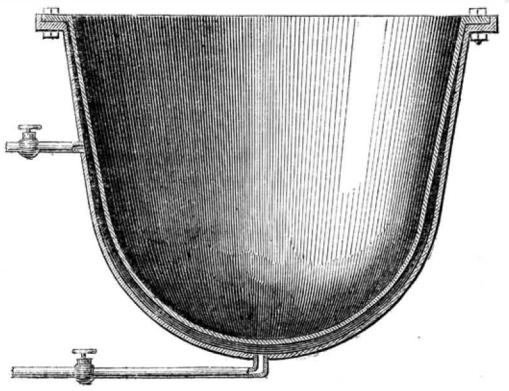
The lumber produced by gang saws is of a superior character, and sells for a higher price than that of single saws; thinner saws can also be used in gangs; therefore, whenever there is sufficient power to cut lumber from logs with a gang of saws ranging from two up to thirty, they should be used in preference to all others.

The trigonometrical survey of Great Britain and Ireland is about to be connected with those of the countries on the continent of Europe. This will permit the measurement of an arc of latitude extending from the west side of Ireland to the Ural Mountains; a fifth of the circumference of the earth.

The New Patent Law.—Copies of the Scientific American, containing the new Patent Law, may be had at our office. Price five cents.

Explosion of an Oil Kettle.

On the 20th of last month a very unusual accident occured at a manufactory of printer's ink in Ann-street, this city. A cast iron kettle 2 feet deep, 2½ feet in diameter, and one quarter of an inch thick,



was placed within an outer kettle, as represented in the cut, the rims ot the two kettles being bolted together and made watertight with cement. About 10 gallons of oil were put into the inner kettle, and the space between the two vessels was connected by a steam pipe with a boiler in which the pressure was about 75 pounds to the inch; the waste pipe being left entirely closed! As might have been anticipated, as soon as the full boiler pressure came upon the space between the two kettles, the inner one was blown out of its place and sent up against the ceiling, scattering the hot oil in every direction, and filling the room with steam. A few drops of oil fell upon the clothes of persons in the room, though not in sufficient quantities to do any material harm; but the scalding steam injured three of them severely, though it is hoped not fatally.

California Hydraulic Mining.

The following extracts are from a letter of Rev. T. Starr King, in the Boston *Transcript*, in which the operations of hydraulic mining in California are described in a very graphic and interesting manner:—

The inventor of this process is Edward Matteson, of Sterling, Conn., and he first applied it in Nevada, in 1852. Astronomers tell us that there are pits in the moon 17,000 feet deep; they say, also, that any object on the moon two hundred and fifty feet high may be detected by the most powerful glasses now in use. If there are astronomers on the moon with equally potent instruments, they will soon be able to detect changes in the surface of California, through the agency of hydraulic mining. All other methods of dealing with the soil for gold are "one-horse concerns" compared with the hydraulic process. It is fast changing mountains on the face of the State into pits. It is, too, an invention which, to the end of time, will defy all competition for tearing all beauty out of a landscape, and setting up the "abomination of desolation" in its place. Connecticut Yankees have been supposed to possess so little sentiment, or taste for beauty, that they would not hesitate, for profit, to "whittle the cedars of Lebanon into clothes pins;" and perhaps it is in accordance with the eternal fitness of things that a process like hydraulic mining, which so thoroughly blasts the beauty of a State and so largely enriches its treasury, should issue from a Connecticut brain. (It ought to be said in justice here, however, that Connecticut has more beautiful villages and towns, and displays more taste in them, than any State in New England.)

Most readers know, undoubtedly, how the tremendous hydraulic power is gained and applied. It is simply playing water through a pipe like a fire-engine, upon the side of a hill which contains gold in its soil, and is to be washed out through sluices. But the water is brought from such a hight, and with such a "head," that stones a foot in diameter, when struck with it, are thrown up ten feet, and a man, if fairly hit by it, might as well have been visited by a six-pounder in full force. Such a stream three inches in diameter tears into a hill as though it were a light heap of powder; and often to hasten matters, the hoseman directs its wrath at the base of a wall of earth, eats it out quickly and sees the whole upper-works tumble in with a frightful crash—perhaps paying the penalty of his boldness with his life. The rivers are already somewhat perceptibly affected, not only in color, but in sediment, by the wide ravage which this leveling of hills and choking of the smaller streams in the upper country is producing. By and by the Sacramento may not be navigable, owing to the rapid emigration of the interior hills to settle along its bed. But so long as the process pays, the navigation interest may plead and warn in vain. It is said that earth which yields only a cent's worth of gold to the pan returns good profit to the hydraulic companies, and that sometimes a thousand dollars a day is obtained out of the mud that rushes along a single sluice.

CIVIL WAR INAUGURATED.

Reluctantly we recall the deplorable fact that civil war has actually broken out in our own country, where peace, happiness and financial prosperity have so long existed.

For some time past a feeling of animosity has prevailed in some of the remote Southern States against the people of the Northern States, who have been charged with imbibing hostile feelings toward the South, for the sentiments there existing on the subject of African slavery.

Soon after the election of Abraham Lincoln to the Presidential Chair, the citizens of South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, and Texas formed themselves into a Southern Confederacy, and after meeting in convention, they adopted a constitution, and elected Hon. Jefferson Davis, formerly member of Congress from Mississippi, President of the Confederated States.

The first step of these Secessionists was the seizure of various forts, arsenals, custom houses, and other public buildings belonging to the Federal Government, and their occupation in opposition to the will of the Federal authorities. Fort Sumter, in the harbor of Charleston, South Carolina, and Fort Pickens, in the Gulf of Mexico, nearly opposite the city of Pensacola, Fla., the Secessionists were unable to obtain. Fort Sumter has been garrisoned with only about seventy men, under command of Major Anderson, for several months; the authorities of the Confederated Government objected to the garrison being reinforced.

The secessionist forces have been busily engaged during the last three months in erecting batteries around Fort Sumter, for the purpose of reducing it. About the time these batteries were completed and manned, the stores at Fort Sumter became nearly exhausted, and the privilege which had been conceded to Major Anderson to get supplies from the city was withdrawn. This step rendered it imperative in the Federal authorities to either surrender the fort or to resort to force to provision the garrison. The latter course was decided upon, and naval ships with stores and soldiers were hastily fitted out and sent to Major Anderson's relief.

The authorities of the Southern Confederacy, learning that it was the determination of the Federal Government to provision the forts at all hazards, made a hasty demand upon Major Anderson to surrender; this he refused to do, and at twenty minutes past four o'clock on the morning of April 12, before the vessels containing reinforcements arrived, General Beauregard, commander of the Southern forces, commenced a cannonade on Fort Sumpter. The fire was returned, and continued until Saturday afternoon, when Major Anderson struck the United States flag and surrendered.

The details of the battle have been telegraphed to our daily papers, but they are so conflicting in their tenor as to be unworthy of record.

It is proper to state that the history of our national troubles, of which we have only given an abstract, is not intended to instruct or enlighten our own people, who are thoroughly conversant with all the facts, but for our patrons in foreign countries, who find it difficult to understand our political affairs.

A telegraphic dispatch just received from Washington states that the President of the United States has issued a proclamation calling out 75,000 militia, and that the first service required of them will be the retaking of the fortifications. An extra session of Congress is also called to meet on the fourth of July next.

Dry clay is found to be the best substance yet experimented with for removing ammonia from coal gas in the purifying process.