

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 Mortgage 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.

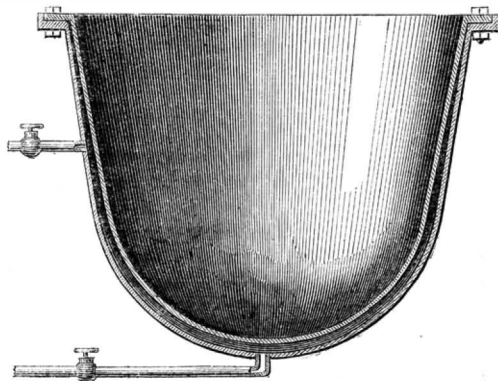
The lumber produced by gang saws is of a superior character, and sells for a higher price than that of single saws; thinner saws can also be used in gangs; therefore, whenever there is sufficient power to cut lumber from logs with a gang of saws ranging from two up to thirty, they should be used in preference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