

Scientific American

NEW YORK, JANUARY 11, 1851.

Bills for Reforming the Patent Laws.

We presume that a brief synopsis of the bills now before the Senate, for reforming the Patent Laws, will be of great interest to a majority of our readers. We will therefore endeavor to present a clear outline of their features. We distinguish the Bill introduced into the Senate during last Session, and the Amendment proposed by Senator Davis, and call them "Bills," for they are totally distinct. The first is nearly the same as the one adopted by the Convention of inventors assembled at Baltimore. It is an amendment to the present Patent Code, and enacts that the Commissioner shall be more specific in giving his reasons for the rejection of patents, and that all correspondence be kept on file in the Patent Office, and all objections made by other parties to the issuing of patents be kept on file, and that certified copies of the said objections, correspondence, decisions, &c., be considered *prima facie* evidence in all cases. It provides pointedly against granting reissues of patents claiming more than what was embraced in the original specification. It provides that no inadvertence or mistake, when remedied, shall have a retrospective effect. It provides for the writ of *scire facias*, exactly as we stated last week. We believe that the writ of *scire facias* will be a benefit to inventors, only the bill should be amended so as to read that "all such cases must be tried in a summary manner." The dilly-dallying of our Courts, the delays, &c., are anything but creditable to our business character as a nation. The great fault which we find to the *scire facias* is, that it authorizes the grant of such a writ in every case. This should not be—there ought to be some limit to it, and in no case would we allow it to be granted until one trial at equity had shown that there was some defect or fault in the patent. This section should be modified. The sixth section provides that any one of the interested parties shall have a right to appeal to the Supreme Court of the United States, in any suit on a patent, in which the validity or construction of a patent is in dispute, and also in any proceeding by *scire facias*. This last clause should be stricken out. We don't want too much of the *scire facias*. The eighth section provides than any patent, extended by Congress through fraud and false representation, be declared void; this section will bear reforming—it should provide the way to prove the fraud. But we would take away the whole practice of Congress extending patents, and adopt some better plan.

These are the main features of the bill, which show any difference to the present code, excepting the 11th section, which allows foreign patents to be adduced as evidence. We dilated somewhat on this last week, and hope our remarks will meet with approval.

The amendment (Bill) proposed by Senator Davis, in the very first section, provides to confer more powers on the Patent Office. Inventors, what do you think it is? Why, it confers on the Commissioner supreme authority, (we will use the very words), he "may refuse to grant letters patent whenever it may appear that the applicant has abandoned his invention." This looks like a cunning touch coming from the Patent Office, to injure the rights of inventors who may see fit to give some public account of their inventions before applying for patents. This never can become a law. The second section provides that those filing caveats should make oath to their inventions. This is all right. The third section provides that, upon complaint and oath of patentees, or their heirs and assignees, of their belief that some person is using their invention secretly, persons may be appointed to examine the premises of the alleged infringer to see if the patent is infringed, but shall be sworn by the judge not to divulge what they may see in the examination, which does not, in their judgment, infringe the patent. "If admission for examination is refused, the

refusal is to be deemed *prima facie* evidence that the person so charged is infringing the patent." We have no comments to make on this clause, because we don't know very well what to think about it just now. The fourth section provides that the fees for additional improvement shall be the same as for the original patent—a rise from \$15 to \$30; also that only one-third of all fees be returned instead of two-thirds, as is now the case. This shows the origin of the Bill;—this is what was recommended by the Commissioner. Is the Patent Office getting poor? If it pays its own expenses, as it now does, and a little more, is it not sheer injustice to raise the fees? It is. The fifth section provides that for every time a patent is questioned in validity, by trial, after the first trial, and decision given for plaintiff, treble costs will be allowed for this second trial, four-fold damages for the third, and so on; and if a patent be decided invalid the same number of times, damages in the same ratio to be allowed for defendant, excepting in some cases where the patent has been affirmed and in others *dis-affirmed*, when the damages are to be adjusted accordingly by the Court. This is a splendid section of confounded confusion. What a fund of trouble it would cost if it were to become a law. The sixth section is a good one; it provides that a jury be instructed to enquire if the defendant has knowingly and willingly infringed the patent; when, if such be proven, he shall forfeit all his machinery or articles which infringe the patent, and this irrespective of damages. There is a provisional clause in this section, which we cannot quote to make sense out of it—it is obscure in its meaning. The seventh section provides that, with the consent of both parties, three experts may be chosen by them to decide a question of infringement, like a jury—the verdict of two to be treated like that of a jury. This is not an objectionable feature, but it is a very inconclusive one. The eighth section provides that no hearing will be granted to parties to contest the priority of invention, before the Commissioner, three years after the grant of a patent. This is right. The ninth section is nearly a duplicate of our present law for designs and ornamental work. The tenth section is but little more than a duplicate of section five of the law of 1842—only fifty dollars for every case is to go to the Patent Fund. The eleventh and twelfth sections are not important, but the twelfth provides that the Commissioner cause to be prepared a general analytical and descriptive index of American inventions and discoveries, and continue the same from year to year, to accompany the annual Report of the Patent Office. This practice is now pursued by Mr. Ewbank; it is commendable in every sense. Section fourteen provides that one compiling clerk be employed at a salary of \$2,000 per annum, and an assistant with a salary of \$1,200. Section fifteen provides that the sum of \$6,000 per annum be appropriated to carry this act into effect, to be paid out of the patent fund. Section sixteen is of no moment, but section seventeen provides for the repeal of the act of 1832, relating to designs, for which sections nine, ten, and eleven are to be substitutes; they are not very important.

These are the principal features of the two bills. Let our Senators be careful and cautious about reforming the patent laws. We will suggest an improvement—a material one—next week. Laws should not be made in too great a hurry, and above all patent laws.

Bain's Telegraph in France.

By the last news from Europe, we learn that Dr. Lardner recently gave a grand soiree at his splendid apartment in the Rue de Lille, to exhibit the new telegraph machines made by order of the government on Mr. Bain's models. It is intended to put them on the Calais line, but it is out of repair, and, therefore, one of the machines has been sent to Tours, to try the experiments on Bain's system on that line. No definitive arrangement has yet been come to for the purchase of the patent by the government; but there is reason to believe that for once the confidence of inventors will not be abused.

The Inventor of the Power Loom.

The Worcester Palladium, of January 1st, publishes a paper from a manuscript left by Mr. Samuel Rugg, of Lancaster, Mass., wherein he claims to be the inventor of the power loom. The document is a singular one, we therefore publish it entire:—

"Having read Rev. Henry A. Miles's history of Lowell, I find he ascribes the invention of the power-loom to Francis Cabot Lowell and Patrick T. Jackson, in the winter of 1812 and '13. In 1811 and '12, I heard they were buying information, at Waltham, respecting weaving; and at that very time I was making cloth at Lancaster, Mass., by turning a crank which moved a band. I also learned that 25 patents were taken out of the patent office. My model and description of a loom, by which I wove cloth, was deposited in the patent office before 1813. I sent it to the office at Washington by the representative from our district, Hon. Abijah Bigelow, of Leominster. In two years after that I heard they were weaving in Waltham by water—it resembled mine very nearly. I had waited two years to find a method to carry the web up as fast as the cloth was made. When there were so much going to the office for patents, they must of course have seen my model and explanation. Why did not Messrs. Lowell and Jackson obtain letters patent, unless because mine was in the office before them? The incentive which led me to the undertaking was being a warm patriot, and the sight of some torries. My wife was a weaver from a youth, and had broken her stomach down. She said I was as crazy a man as she ever saw, for if such a thing could be done, it would have been done somewhere in the world before that time. I persevered, with my head sometimes between my knees, till I thought of turning the lathe topsyturvy, and then with a shaft underneath, with figures or cams fixed on it, I contrived to spread the warp, throw the shuttle, and beat up the thread. But I had to let it off every two inches, or there would be a gall in the cloth. I had been exposed, and thought best to send my invention to Washington: and by that means sent it into the world."

[No doubt honest old Samuel Rugg was sincere in his opinion that he was the first inventor of the power loom; in all likelihood he never saw one before he made his own; but Vancausin had suggested one long before our Revolution, and Dr. Cartwright received a patent for one in 1747; and in 1790 a power loom factory was established in Doncaster, England, which was driven by a steam engine; this was at least twenty-three years before honest Samuel Rugg claimed his invention.

Passages of the Atlantic Mail Steamships from Liverpool to New York, from Sept. 21, 1850, to Jan. 1, 1851.

The Pacific (American) arrived in New York on Saturday evening, 21st Sept., 1850, after a passage of 10 days 4½ hours. This was the shortest passage ever made between the two ports.

The Niagara (British) arrived at New York on Friday the 27th Sept., after a passage of 12 days 20 hours.

The Atlantic (Am.) arrived at New York on Wednesday, 9th Oct., at 10 A. M. She left Liverpool on the 25th Sept., at noon—passage 13 days and 22 hours.

The Europa (Br.) arrived on the 11th Oct., at 8 A. M. She left Liverpool on the 28th Sept., at 2 P. M., thus making the passage from port to port in 12 days and 18 hours. She anchored, however, outside the Hook at half-past 9 P. M., on the 10th.

The Asia (Br.) arrived on Thursday, Oct. 24, at 11 A. M., after a passage of 10 days and 23 hours.

The Pacific (Am.) arrived on the 26th Oct., at 12½ P. M., after a passage of 11 days 2½ hours. She left Liverpool at 10 A. M.

The Africa (Br.) arrived on Friday the 8th Nov., at 8 A. M., after a passage of 12 days and 20 hours—her first passage.

The Atlantic (Am.) arrived on Tuesday the 12th Nov., at 1 P. M., after a passage of 12 days 22 hours.

The Niagara (Br.) arrived on the 22nd Nov.,

at 9 A. M., after a passage of 12 days 21 hours.

The Arctic (Am.) arrived on Wednesday the 5th Dec., at 8 P. M., after a passage of 14 days 8½ hours.

The Asia (Br.) arrived on Saturday Dec. 7, at 10½ A. M., after a passage of 13 days 22 hours.

The Africa arrived on Saturday evening, 21st Dec., at 12 P. M., after a passage of 14 days 12 hours.

The Baltic arrived at New York on the 1st January, 1850, after a passage of 18 days from port to port, but she arrived at Provincetown, Mass., on Sunday, to take in a supply of coal, and thus was detained more than three days.

[We intend to keep a quarterly record of the passages made from Liverpool to New York, the same as the above, which we know will be of great interest to many of our readers.

Compound Gases—Oxygen and Hydrogen.

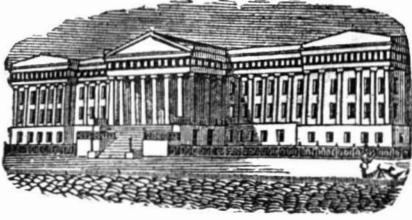
It has generally been allowed that water is a compound of two simple substances, oxygen and hydrogen. The late discoveries alleged to have been made by Mr. Paine, go to prove that water is not composed of these two gases; or, as asserted by Mr. Paine, oxygen is composed of one gas and positive electricity, and the same gas is hydrogen when combined with negative electricity. So far as the catalyzing of the hydrogen is concerned, to enable it to produce a white light, by simply passing through turpentine, the communication on another page, from Dr. Foster, confirms all that has been said about it, as being perfectly correct. Mr. Nasmyth, at a meeting of the British Association, stated that he believed carbon to be a metal, but we have never heard a single hint relative to hydrogen being one.

Nitrogen is called one of the simple bodies, but Davy believed that it was a compound. Oxygen is held to be a simple gas, but Mr. Nelson, in 1848, in a series of articles, entitled "New Chemical Law," published in Vol. 4, Sci. Am., uses the following language—"Oxygen must be a chemical compound; some future attempt at its decomposition may prove effectual; it is at least worthy of a trial, for it plays an important part in nature; a true knowledge of its composition is therefore much to be desired." He also held fluorine to be a chemical compound. We wish to call attention to these things because we conceive that there is much in the articles of which we speak that is worthy of attention. The article from which we take the above extract will be found on page 112, Vol. 4, Sci. Am.

Veto of the Gas Contract.

Mayor Woodhull vetoed the contract passed by vote of our Common Council with the City Gas Companies, which was to last for eighteen years, as mentioned by us last week. The Mayor has received the heartfelt thanks of our whole city for his veto. The contract was an outrage upon the principles of honesty and decency. By the veto message we learn that the companies receive for each gas lamp from \$11 to \$12 each, the same as for oil lamps. By the new contract the companies were to receive \$15 per year for each public burner—being \$3 more than they now receive, or \$26,985 dollars per annum. Fifteen dollars for each burner—this is going it with a rush. In some of the cities of Great Britain, where such contracts have been left to public competition, one burner costs no more than \$3 per annum. In our country, where monopolies should not be allowed to fatten on the public, we see that it is just the land for them—especially New York Gas Monopolies. The most iniquitous feature of the new contract was the annulling of the old one, of \$12 for each lamp, and the contract for \$15 for each to come into operation on the 1st January, 1851, while the old contract did not expire until 1853—thus a bonus of more than \$12,000 was to be paid to the companies for being so kind as to receive a new contract for eighteen years of the future history of New York City. We dislike this legislation for succeeding Municipal Governments.

We are indebted to Senator Benton for a copy of his speech upon the highway to the Pacific. It contains interesting information.



Reported expressly for the Scientific American, from the Patent Office Records. Patentees will find it for their interest to have their inventions illustrated in the Scientific American, as it has by far a larger circulation than any other journal of its class in America, and is the only source to which the public are accustomed to refer for the latest improvements. No charge is made except for the execution of the engravings, which belong to the patentee after publication.

LIST OF PATENT CLAIMS
Issued from the United States Patent Office.

FOR THE WEEK ENDING JANUARY 1, 1851.

To C. J. Anthony, of Pittsburgh, Pa., for improvement in Daguerreotype Pictures.

I claim the application of transparent or translucent materials, of varying thicknesses and forms, separately or in combination with each other, and the application of substances or materials, more or less opaque, either separately or in combination with transparent or translucent materials, both or either, when such applications and combinations are separately, consecutively, or conjointly employed for the purpose of manipulating the action of light, or chemical substances, substantially in the manner and with similar effects to those described and shown.

To Silas M. Cochran, of Baltimore, Md., for improvements in Car Couplings.

I do not claim the method of coupling railroad cars &c., by means of double coupling irons or jaws, in combination with a sliding bar for disengaging or unlocking said double irons or jaws to relieve the connecting bolt from the draught beam of the leading car, by the deflecting of said leading car from the proper line,

But what I claim is, in combination with the curved arms or ends of the jaws, the turn-slotted bar attached to the casting, having its ends curved in such a manner as to act as levers, and the spring for keeping the slotted bar and jaws in their proper position, the disconnection of the cars being effected by the contact of the curved arms or ends of the turning bar in the draught beam, when the preceding car runs off the track, when either of the curved arms of the jaws will be relieved from the slot of the turning bar and permit its curved end to move outward and open its outer end, and permit the connecting bolt to pass therefrom.

To J. B. Collins, of Reading Pa., for improved Nozzle for Lead Pipe Machines.

I claim the corrugated nozzle, with its mandrel, through which melted lead is pumped, for the purpose of making pipe, as herein set forth.

To W. E. Cornell, of Boston, Mass., for improvement in Planing Machines for dressing the edges of boards.

I claim the method, substantially as described, of communicating motion from the bottom to the top roller, by the two pinions, combined with the wheel having the inner and outer rim of cogs, by means of the joint links, substantially as described and for the purpose specified.

I also claim operating the machinery for carrying the cutter wheel towards or from the line of motion of the plank, by the passage of the plank over and in contact with a spur wheel or wheels, substantially as described, whereby the motion of the cutter wheel for edging tapering planks, will be made to correspond with the motion of the plank itself, as described.

I also claim interposing between the wheel or wheels, actuated by the planks and the carriage of the cutter wheel, a reversing motion, substantially as described, by means of which the machine can be made to act on the plank, from the narrow towards the wide end, or vice versa, or by suspending its operation, edge the plank with parallel sides, as described.

To John Ericsson, of New York, N. Y., for improvement in Water Metres.

I claim connecting the two pistons with

the two cranks of a crank shaft, in the manner substantially as described, so that at the end of each stroke of either of the pistons, it shall remain at rest, while the crank shaft is being impelled by the other piston, so that the valves shall be shipped, whilst the piston is at rest, for the purpose, substantially as described.

I also claim, in an instrument for the purpose, herein specified, determining the range of motion of the pistons, by means of stops connected with the cylinders and the pistons, substantially as described, in combination with the connection of the piston with the crank or cranks, by means of a joint having sufficient play to permit the pistons alternately to remain at rest, while the crank shaft continues to rotate, substantially as described.

I also claim enclosing all the moving parts of an instrument, substantially as above described, in the surrounding casing, through which the water or other fluid passes to be measured, constructed and operating in the manner and for the purpose substantially as described.

To Daniel Fisher, of College Corner, Ohio, for improvement in Churns.

I claim connecting two vertical churns by a horizontal tube at their bottoms, substantially as described (said tube being about ten inches long and about one-fifth of the capacity of one of the vertical cylinders,) in combination with the perforated cutters, operating in the manner and for the purpose herein fully set forth.

To S. H. Gilman, of Cincinnati, Ohio, for method of connecting the slide valve with the rock shaft.

I claim the tubular vent serving the twofold purpose of a guiding rod and a clamp for the ball-joint, at the foot of the valve pitman.

To L. D. Grosvenor, of Harvard, Mass., for improvement in machines for assorting broom corn.

I claim the combination of the endless platform, the roller, and the series of pressure rollers, or any mechanical equivalents therefor, as arranged and made to operate together, substantially in the manner and for the purpose, as described; and in combination therewith, I claim the rotary shears and the weighted roller, or their mechanical equivalents, the whole being applied and made to operate together, essentially as herein specified.

To Abraham Kaufman, of Orrstown, Pa., for improvement in Quilting Frames and Apparatus.

I claim the movable frame, working on the connecting piece containing two slides with wickers, for the purpose of stretching the quilt to any desirable length or breadth, as the case may be, in combination with the slides working in sections, by which the quilt may be enlarged or diminished, and the rollers as set forth.

To John Lamb & C. H. Root, of McDonough, N. Y., for improvement in Spring Carriage Wheels.

We claim the construction of the spokes of flat steel, split or divided, and curved and secured, for the purpose and in the manner herein shown.

To James Manning, of Middletown, Conn., for improvement in Candlesticks.

I claim the combination of the flanch with the circular cap, having its orifice eccentric with its periphery, and a guard operating in the manner and for the purpose as above described.

To Sheldon Northrop, of New Milford, Conn., for improvement in Looms for weaving seamless bags.

I claim the arrangement in one loom, of the two series of cams, substantially as described; one series for weaving the cloth double, and the other single, as herein described, in combination with the shifting the treddle from one series of cams to the other, or the equivalent thereof, substantially as herein described.

To James P. Ross, of Lewisburgh Pa., for improvement in Seed Planters.

I claim, first, the pinion working between fixed and movable racks, in combination with the elevating yoke and the loop on its end, for the purpose of raising the teeth from the ground and simultaneously throwing the feeding apparatus out of gear, substantially as set forth.

Second, I claim the feed gear, as described, in combination with the lever and its adjustable fulcrum, permitting the pinions to be reversed, by which double the number of changes can be made as can be done by the same

number of pinions in the ordinary arrangement.

To Stephen P. Ruggles, of Boston, Mass., for improvement in Printing Presses.

I claim the gauge bar for cards, in combination with the vibrating platen and stop finger, and crank which operates the same, in the manner and for the purpose herein above described.

I also claim the use of a segment of a cylinder, in combination with the stationary form bed, so the rotary inking apparatus may move over the form, and then, after taking ink from the fountain, distribute it on said cylinder, as herein set forth.

I also claim the movable bearers on the side of the form bed, arranged and operated substantially as herein described, so as to be moved outwards when the inking rollers are passing over the form, and drawn inwards when the sheet or tympan is moved up to said form.

I also claim regulating the delivery of the ink by combining with the delivery roller a grooved ratchet wheel and weighted pawl band, operating with the lever stud, cam roller, and stop lever, substantially as herein specified.

I also claim supporting the journals of one of the inking rollers on sliding bearers, so that it may be moved up against the delivering roll, by means of studs on said bearers and cams operating the same as herein set forth.

To Jonathan Russell, of Philadelphia, Pa., for improvement in Machines for turning irregular forms.

I claim the combination and arrangement of the horizontal carriages, G G, working inside of, and moving vertically with the carriage, F, and operating as herein described, for the purpose of making the pattern and rough material pass and repass the tracers and cutting tools, or vice versa, when the same are used in combination with a pattern and rough block, which do not revolve, and are presented to and operated upon by said tracers and cutters, as herein described, and for the purpose set forth.

To J. T. Trotter, of New York, N. Y., for improvement in the manufacture of India Rubber.

I claim the use and employment of zinc, substantially as prepared by the process above described, in combination with india rubber, for the purpose of curing or vulcanizing it, in form and manner as herein set forth, without the use of free sulphur, in any way, in combination with the rubber.

RE-ISSUES.

To Edward Reynolds, of Haddonfield, N. J., for improvement in a machine for bending or setting fellos for the wheels of carriages and wagons. Patent dated July 17, 1835; extended July 11, 1849; re-issued Jan. 1, 1851.

I claim the method, substantially as described, of bending fellos for carriages, by means of a cylinder upon which the felloe is bent, and a friction roller or its equivalent, against which it is bent, substantially as described, when used in combination with a strap for preventing the wood from splitting on its exterior surface, or otherwise.

DESIGNS.

To Wm. C. Davis, of Cincinnati, O., for design for a Cooking Stove.

To Chas. Gilbert & W. G. Hallman, of Philadelphia, Pa., (assignors to Chas Gilbert, of Philadelphia, Pa.), for design for Stove.

Niagara Suspension Bridge.

The Trenton Gazette states that John A. Roebling, Esq., of that place, has been appointed by the Niagara Suspension Bridge Company to enlarge and improve the Suspension Bridge in such a manner as to render it fit and proper for the passage of Railroad cars. Mr. R. will commence the work in the coming spring, and complete it within the year. The undertaking is in connection with the Rochester, Lockport, and Niagara Falls Railroad, the construction of which is to commence without loss of time.

Increase in Price of Scotch Pig Iron.

By the last news from Europe, the price of Scotch pigs had advanced from one to two shillings and sixpence per ton, and in Staffordshire the pig iron makers have established a resolute return to the figures at which they were selling three months ago, being in some instances equivalent to a still more considerable advance.

For the Scientific American.
Mechanical Principles.—No. 2.

In respect to the law of gravity, it is well known that there is a diminution of it as we ascend mountains, and it also diminishes as we descend mines, because the stratum of earth above opposes instead of assisting the attraction of that below. This has been proven by swinging a pendulum at the bottom of some mines. The attractive force, termed gravity, has been shown by a plumb line near mountains. In 1774, Maskelyne noticed a deflection of 6" from the vertical position of the plumb line in the mountain of Schehallian.

Gravity, then, is a universal property common to all matter—every particle in the universe attracting every other particle. The attraction, however, between two bodies, both of moderate size, is too feeble to be observed under common circumstances. But the attraction of ships upon boats is well known, and many bathers have experienced it in their own bodies, when near large vessels, in the water. By careful measurement, its force in the latitude of London is such as to cause a body to fall through a space of nearly 32 2-10 feet in the first second of time, supposing that body to fall in vacuo.

In order to determine the space which a body, falling freely by the action of gravity, would describe in a given time, we must multiply the square of the time in seconds by 16 1-12 (or, as an approximation only, simply by 16); the product will be the space fallen through by the body in feet. To determine the time which a body would occupy in falling from a given height, we must divide the square root of the height in feet by 4; the quotient will be the time occupied in seconds. To determine the velocity which a body, exposed to the action of gravity for a given time, would acquire, multiply the time in seconds by 32 1-6, and the product will be the velocity in feet per second; or to determine the velocity acquired by a body in falling from a given height, multiply the square root of the height in feet by 8 1-24, (or, as an approximation, simply by 8), and the product will be the velocity of the body in feet per second.

The following table, constructed on the same principle as that given above for any force whatever, contains the actual numerical values of the several quantities for a body falling freely by the action of the force of gravity.

Time in seconds of the body's fall- ing.	Velocity acquired by the body in feet per second.	Space in ft. fallen through by the body in the whole time.	Space in ft. fallen through by the body in each second.
1	32 1-6	16 1-12	16 1-12
2	64 1-3	64 1-3	48 1-4
3	96 1-2	144 3-4	80 5-11
4	128 2-3	257 1-3	112 7-12
5	160 5-6	402 1-12	144 3-4
6	193	579	176 11-12
7	225 1-6	788 1-12	209 1-12

What gravitation is we scarcely dare speculate. Some consider it to be magnetism, and there is much plausibility in some of the arguments brought forward to prove this. We know that it is a power higher than the more tangible forces with which we are particularly acquainted; it is a power which spans all space, and its very subtlety proves that there is a power beyond it more subtle still. The law of falling bodies, (with which every mechanic should be well acquainted, or he will find his mind somewhat shackled), was first discovered by Galileo, but it obtained a more complete development in later times, by the machine of Attwood.

At the commencement of the study of the principles of falling bodies, let it be understood that a body begins to fall from a state of rest, and the further it falls its velocity increases uniformly with the increment of the time it occupies in falling, and then there can never be any mistake made, for if the velocity increases with the time a body takes to fall, it will fall through a greater space during the third second of time than during the second or first seconds. If no such law existed, there would be no more power in a fall of water 32 feet high, than one of 2 feet.

MACLAURIN.