

great that it can be worked up to 100 indicated horse power.

The high pressure cylinder is 6 inches in diameter, and the low pressure cylinder 16 inches in diameter, the stroke of the pistons being 12 inches, and their depths or thickness 6 inches. because the lowest working pressure of the steam is 200 lbs. on the square inch, and the highest pressure, 400 lbs. on the square inch in the small cylinder. It will be noticed that the pistons have no rings or springs, but grooves are formed in them to keep them tight on a well known principle. [Patented by Wm. S. Gale, of New York city, July 21, 1857.] The cylinders have wrought iron liners for the purpose of renewal and strength.

The steam valves are cylindrical, with the ports cut out as required; the steam or cut-off valve is fitted in the larger or exhaust valve for the high pressure cylinder, while, for the low pressure engine, two single cylindrical valves are used—half cut in two for the exhaust. Mr. Burgh has had some experience, he informs us, in the working of those valves, and, with careful proportions, they answer well under steam of high pressure.

The next features worthy of notice in the arrangement are the dimensions over all, in proportion to the indicated horse power. The diameter of the boiler or casing inclosing the cylinders is 2 feet 5 1/2 inches, and the total depth from the dome to the stuffing boxes is 3 feet 3 inches. The tubes are each 1 1/2 inches outside diameter, 2 feet long, and 144 in total number, making an area of 122 square feet heating surface for the tubes only, to say nothing of the surface of the cylinder casing, to which the tubes are secured.

Another matter the inventors claim is that, in large vessels, the stoking, with inverted engines, is on the second deck, or it may be often on the weather deck, so that hot stoveholes low down in a ship are eliminated.

It will probably be found in practice that the heating surface provided is too small; but let opinions on the subject of proportion be what they may, it is certain that the scheme, as a whole, is sufficiently novel and promising in numerous respects to entitle it to the prominence which we have given to it.

Salt Water for New York City.

New York city, it is well known, is almost surrounded by salt water, as it occupies a tongue of land, some fourteen miles long and about a mile broad, the sea water flowing up along both sides. The city is at present supplied with fresh water, for extinguishing fires and all other purposes, by the Croton Aqueduct, 42 miles long, which conducts the Croton river into the city. But this supply is becoming rather inadequate, especially in cases of fires, and the idea of using the river water is now being studied.

A meeting of the municipal Committee to consider plans on this subject, was lately held. One proposition was to provide a series of floating fire engines to patrol around the city, and throw up water from the docks when required.

Thomas Miller's plan was that water should be drawn from the river and forced into a column or receiver by a pair of heavy duplex pumps. The water would be carried into the sewers by the overflow when the column was full, and when the pumps were working at full speed the thirteen inch supply pipe would provide more water than the 22 1/2 inch fire nozzle could draw off. A house would be built around the base of the column for the purpose of keeping hose carts ready for use at any time. The upper part of the building would be reserved for the use of the employees. The streets could be excavated, pipes be laid from the river and the whole plan be carried out within eight months, at a cost of from \$160,000 to \$180,000.

William Nelson, Jr., proposed that pipes should be laid from river to river every ten streets below Fourteenth street, beneath the surface of the river, so that there would always be a supply of water. The cost would be about \$10 a foot.

Captain Hugh McKay submitted a plan whereby salt water, as the tide ebbs and flows, may be forced into towers or reservoirs, placed on the wharves.

A Simple Method of Warming Greenhouses.

The London Grocer suggests that greenhouses, containing half-hardy plants and in which no regular method of heating exists, may be warmed even during a hard frost by lighting and distributing a dozen or so common oil lamps, at convenient localities. In selecting these lamps they should be chosen with vases large in proportion to the size of the flat wick, in order that they may continue burning all night without refilling or other attention. It will be readily understood that, whether one or many lamps are used, the total amount of heat given off is proportionate to the quantity of oil burned, provided the combustion is complete. And in using a lamp, all the heat of combustion is utilized; none goes up the flue as with stoves or fire places.

The same journal, we notice, refers to Pratt's Astral Oil as a very carefully and skilfully refined petroleum product. As this material, in addition to other advantages, possesses that of safety, it would be especially suitable for use as above described.

SWEDEN is taking her place among inventive nations. Some very ingenious and useful inventions have recently been sent to this country to be patented. During the past week we have filed in the Patent Office applications from two different parties, natives of Sweden, and have since received instructions to prepare a third case, the latter the invention of a Swedish lady, residing in Stockholm.

A LARGE WATER WHEEL.—A correspondent, R. H. D., reminds us that there is at Rockville, Conn., a breast water wheel 55 1/2 feet in diameter and 10 feet wide.

Cheap Postage Coming.

We recently chronicled the passage of a law abolishing the franking privilege, as a result whereof a reduction of postage was expected. We are glad to say that the House of Representatives has recently passed a bill reducing the postage on all letters from three to two cents. We earnestly hope that the Senate will also pass the bill, so that it may become a law.

The bill also provides that newspapers shall be prepaid at the office where mailed.

The Way the Forests Go.

Some idea of the vast extent of the lumber trade and the rapidity with which our great forest trees are being consumed may be had if we notice the products of a single saw mill in Michigan, that of A. W. Sage & Co., in the Saginaw Valley. This firm does business in Brooklyn, N. Y., and in several other cities. The mill alluded to cuts and turns out as high as 370,000 feet of lumber in a single day. Five engines and eight boilers, yielding six hundred horses power, together with the services of 300 men, are required. The buildings are very extensive, lighted with gas, and supplied with every convenience for work that ingenuity can suggest.

DANKS' ROTARY PUDDLER.—At a late meeting of the National Association of Iron Manufacturers at Philadelphia, Mr. Samuel Danks addressed the members in regard to the practical benefits of his rotary puddler. He has lately returned from England, where, after encountering considerable opposition, he succeeded in introducing about fifty of his furnaces, with a prospect that his invention will be generally adopted. In the United States, these furnaces are in successful operation in Cincinnati, Chattanooga, Tenn., and at the Millville Works, Pittsburgh, where a new mill has just been added at an expense of \$500,000, intended to contain five of these furnaces.

TEN THOUSAND REAPERS AND MOWERS A YEAR FROM ONE CONCERN.—The new reaper and mower works of McCormick and Brother, at Chicago, at the junction of Western Avenue and Blue Island Avenue, occupy an enclosed space of twenty-three acres. In 1847 they made 500 machines; but they now manufacture 10,000 machines per annum. The present buildings cover three sides of a square, are five stories high, have a front of over 1,000 feet in length, and there is also a three story middle building. On the lake and canal, the works have a front of 1,300 feet.

THE BAR AT THE MOUTH OF THE MISSISSIPPI.—E. K. R. writes to say that Mr. C. W. Stewart is in error as to the number and inefficiency of the dredge boats employed in keeping a clear channel through the bar. Only two boats are employed, and the channel is kept free to a depth of 17 feet at mean low water.

At a recent meeting of the Royal Astronomical Society, a paper by Mr. Hind was read, relating to the solar eclipse of the year 2,151, which, it appears, will not be total in London though very nearly so. It will be total, however, in Sheffield. Mr. Dunkin suggested the possibility that no considerable proportion of those present would see the eclipse in question; and the meeting appeared to agree with him.

THE navigable balloon of M. Dupuy de Lome, the distinguished French engineer, is varnished with a composition made up of 3 equal parts of gelatin, glycerin, and tannin, dissolved in 12 parts of pyroligneous acid. The varnish has been on fourteen months and is in perfect condition.

If the total length of railroads in all countries is 146,248 English miles, as has been computed, it is not surprising that their maintenance, together with the new construction, takes more than half the iron production of the world. Europe has 48 per cent and America 47 per cent of the whole.

NOT only will the repeal of the franking privilege save so much, directly, to the Department, but it will lead to the suppression of a large portion of Congressional printing, heretofore ordered by Congress.

THE Commissioner of Patents has granted a patent to George C. Campbell, for putting a mixture of corn meal and rye meal into a package, as a new article of manufacture.

Facts for the Ladies.—Mrs. D. W. Torrence, New York, uses the Wheeler & Wilson Lock-Stitch Machine for her own family sewing, and besides doing her housework, earns more than a dollar per day as pastime. See the new improvements and Woods' Lock-Stitch Ripper.

WHERE AND HOW TO ADVERTISE.

The value of advertising is so well understood by established business firms, that a hint to them is unnecessary; but to persons establishing a new business, or having for sale a new article, or wishing to sell a patent, or find a manufacturer to work it: upon such a class, we would impress the importance of advertising. The next thing to be considered is the medium through which to do it.

In this matter discretion is to be used at first; but experience will soon determine the papers having the largest circulation among the class of persons most likely to be interested in the article for sale, will be the cheapest and bring the quickest returns. To the manufacturer of all kinds of machinery, to the vendors of any new article in the mechanical line, and for proposals for all kinds of engineering works, we believe there is no other source from which the advertiser can get as speedy returns through the advertising columns of the SCIENTIFIC AMERICAN.

We do not make these suggestions merely to increase our advertising patronage, but to direct persons how to increase their own business.

The SCIENTIFIC AMERICAN has a circulation of more than 45,000 copies per week, which is probably greater than the combined circulation of all the other papers of its kind published in the world, and ten times greater than that of any other publication of its class. A business man wants something more than to see his advertisement in a printed newspaper. He wants circulation. If it is worth 25 cents per line to advertise in a paper of three thousand circulation, it is worth \$2.75 per line to advertise in one of forty-five thousand.

PATENT OFFICE DECISIONS.

IMPROVEMENT IN BILLIARD TABLES.—COLLENDER VS. GRIFFITH.—INTERFERENCE.

If an application is filed for a mechanical patent for construction, and if a design for which a patent has been granted can be produced only by that construction, an interference should be declared between the application and the patent.

TEACHER, Acting Commissioner:

This is an appeal from a decision of the Examiner dissolving the interference. The main reason for the dissolution is that an interference is improper between an application for a mechanical patent and a patent for a design.

The decision of the Examiner dissolving the interference is overruled.

IMPROVEMENT IN HARVESTERS.—DEAS. G. DICKINSON.—EXTENSION.

Where an assignee of a patent has had it reissued, and the inventor has accepted an assignment of one half of the reissued patent, he cannot have an extension of the original.

TEACHER, Acting Commissioner:

In 1868 Dickinson assigned to J. R. Parsons all his right in the patent "and in all extensions and reissues of the same." In May, 1871, Parsons surrendered and reissued the new patent being granted to him as assignee. Parsons then applied for an extension, applicant has obtained from Parsons a re-transfer of one half interest in the invention. Petitions for the extension of the original patent, and bases his right to the same on the fact that the reissue was obtained without his knowledge and consent, and that he never has taken an interest therein. If this was the fact the application would be proper, and the prayer of petitioner, the testimony being sufficient to Dickinson, however, Parsons transfers to him "one undivided half part of my entire interest in said invention and letters patent issued therefor." Now, the only patent in which the assignor had an interest at the time of making the instrument was the reissue obtained by him, and it is evident, therefore, from the terms of the assignment, that by the transfer the assignee became invested with a one half interest in the reissued patent. Judge Blatchford, in Foster vs. Brownedock, 7 Blatchford, 97, where the extension of an old patent which has been reissued and declared valid, bases his decision upon the fact that the original patent had never assigned to the reissue or acquired any title thereunder. This is set forth so distinctly as to authorize the conclusion that the converse must be true—that is, if the inventor by any act of his own has adopted the reissue, or in any way assented thereto, the extension of the original patent would be invalid. The purchase by the original inventor of an interest in the reissued patent stamps the act of surrender and reissue with his approval; an assent in words could not be stronger.

I have come to the conclusion, therefore, that the extension of the original patent in this case would be invalid, and the prayer of the petitioner must consequently be denied.

DECISIONS OF THE COURTS.

United States Circuit Court—Southern District of New York.

THE LOCOMOTIVE ENGINE SAFETY TRUCK COMPANY VS. THE ERIE RAILWAY COMPANY.—PATENT OF A. F. SMITH, FEBRUARY 11, 1862, FOR TRUCKS FOR LOCOMOTIVES.

[In Equity.—Before Blatchford, Judge.—Decision December 30, 1872.]

BLATCHFORD, Judge:

This suit is founded on letters patent granted to Alva F. Smith, February 11, 1862, for an "improvement in trucks for locomotives."

The claim is: "The employment, in a locomotive engine, of a truck or pilot wheels, fitted with pendulum links to allow of lateral motion to the engine, as specified, whereby the body of the driving wheels to remain correctly on the track, in consequence of the lateral motion of the truck allowed for by said pendulum links, when running on a curve, as set forth."

The issue is as to the novelty of the invention. I order to determine this question, it is necessary to clearly see what invention is claimed in Smith's patent.

He does not claim laterally moving trucks—that is, trucks with laterally swinging bolsters. Nor does he claim pendulum links by themselves. Laterally moving trucks applied to railroad cars which had at each end one of such trucks, free also to swivel around a king bolt which connected the car to the truck and passed through the center of the swinging bolster, which was the center of the truck, were old. The specification so admits. But Smith's invention, as claimed, is for the use in the combination with a locomotive engine—that is, a structure having at its rear end a pivot on the body of the engine—of a swinging pilot or leading truck, provided with pendulum links to allow the forward part of the engine to move laterally over the truck when the truck and the driving wheels are not together in a straight track, whereby the forward part of the engine can move forward in a line tangent to a curve, while the axes of the driving wheels of the truck wheels also become parallel to the radial line of the curve, because the truck is made to swivel around the king bolt by the action of the rails on the flanges of the truck wheels.

The patent granted to Bridges and Davenport, May 4, 1841, for an "improvement in railway carriages," shows a swinging bolster in a truck swinging on a king bolt, the body of the car being connected to the truck frame by pendulum links, from which such body is hung, whereby a lateral motion of the truck is permitted, independently of the body of the car, the sidewise motion being checked by springs in the truck. But the specification of that patent does not suggest the use of such truck in any other structure than a car having one of such trucks at each end and two king bolts. Nor did it, or the use of two of such swinging bolsters in a car, suggest, from 1842 to 1862, the combination of such a swinging bolster truck with a locomotive engine, for the purpose set forth in Smith's specification.

The only other pre-existing invention brought up to affect the novelty of the Smith invention is the patent granted to Levi Bissell, August 4, 1857, for an "improvement in trucks for locomotives." Bissell's truck is shown as the forward part of a locomotive engine. It has a provision designed to allow lateral motion of the truck independently of the motion of the body of the engine, and a provision to cause the forward part of the engine to mount up an incline toward the outside, in a curve, and thus check the sidewise movement, and to descend by its gravity to the normal position on resuming the straight track. The specification then points out the difficulty of the use of locomotive engines on curves with the ordinary pilot truck, resulting in a "constant sidewise sliding motion on the rail," in consequence of the driving wheels being forced in a line deflected from that of a cylindrical forward rolling motion, and in a constant bearing of the truck to the outside of the curve, and in the tendency of the engine to go off the track, "particularly in case a broken rail or obstruction occurs, when the truck swivels around its center pin." It is apparent that the truck in Bissell's locomotive has no swiveling motion around its center pin or king bolt—that is, around the center pin in the center of the truck which connects the truck with the engine. Bissell expressly states that such center pin loses its character as a center of motion and becomes simply a draft block or pin, and that the center of motion of the truck—that is, its only center of motion—is thrown back to the point h outside of the truck.

In the engine of Smith the truck wheels and the drivers can at all times when the engine is on a curve, and when it is leaving a curve, and when it is passing from a curve in one direction to a curve in another direction take their proper position, respectively, without either being controlled or interfered with by the other. The reason for this is that the truck in the Smith engine has a swiveling motion on its king bolt, and also admits of the swinging motion across the track of the engine over the truck or the truck under the engine. Neither of these motions affects the other. If either motion interfered with the other the same result would follow as in Bissell's engine, and the position of the drivers would at times be out of the position of the axes of the truck wheels. But with Smith's arrangement there are no such motions. The position of the axes of the truck wheels, and therefore they assume their correct position on any track, straight or curved, and on any form of curve, and whether the drivers are on a straight track with the truck wheels, or on the same curve with the truck wheels, or on a straight track while the truck wheels are on a curve, or on a curve while the truck wheels are on a straight track, or on one curve while the truck wheels are on a different curve. This is a result not attained in Bissell's arrangement, and it results from the fact that the arrangements and modes of operation of the two structures are different. The truck wheels in Smith's engine are never twisted on the track, and the direction of the longitudinal center line of the engine does not affect the position of the truck wheels.

It results from these considerations that, in the engine as a whole, the Smith arrangement of truck is not merely an equivalent for the Bissell arrangement of truck, because, when the former is substituted for the latter, the resulting structure has a different mode of operation, and produces results which the other structure cannot produce. The thing to be looked at is the combined and mutual action of the drivers and the truck wheels, for that was the problem which both Bissell and Smith were trying to solve. Smith's claim is substantially a claim to the combination, with the drivers, of a truck arranged as he describes, allowing of the lateral motion described, and securing the proper position of the truck wheels on the track on curves. That combination is not found in Bissell's engine.

It needs no argument to show, in view of the foregoing considerations, that there was a patentable novelty in the combination which Smith made in his engine, although the truck which he employed existed before, as in the Kipple and Bullock truck. The combination produces a new mode of operation and new results in the structure as a whole, although the truck, as respects itself, in swiveling and in having a lateral movement operates in the same way it did in the car which had two of such trucks.

Decree with costs to the plaintiff. Keller & Binks, for complainant. C. A. Shepard, for defendant.

NEW BOOKS AND PUBLICATIONS.

THE YALE NAUGHTICAL ALMANAC FOR 1873. C. C. Chatfield & Co, 460 Chapel Street, New Haven, Conn. Price 35 cents.

An amusing little pamphlet, something after the "Josh Billings' Almanax" style, illustrated with humorous sketches of student life at Yale. Graduates and undergraduates of that venerable institution will doubtless find the book of especial interest and entertainment.