

# SCIENTIFIC AMERICAN

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## TRACTION ENGINE WITH SPRING WHEELS.

The object of these improvements is to provide the engines with means for relieving them from some of the shocks and strains to which they are subjected, particularly when working on hard and uneven roads.

Our engravings illustrate the latest improvements by Aveling & Porter, devised to give not only radial elasticity, but also a yielding in a circumferential direction, so as to enable the pull of the engine to be exerted through an elastic medium. The engine has been employed on the paved streets of the town and on country roads, and has run no less than 2,000 miles on these spring wheels, doing very heavy work most satisfactorily and without failure, so that the arrangement may be considered to have passed beyond the experimental stage.

We give from *Engineering* a perspective view of a six-horse road locomotive fitted with these wheels, and two sections of the wheels showing the details of their construction. In the case of the engine illustrated, the driving wheels are 7 feet in diameter, and the outer rim is, as shown in Fig. 3, composed of two T-iron rings of very substantial section, united by an external ring of plate iron 14 inches wide. The inner part of the wheel, on the other hand, consists of a cast iron boss of the usual form, carrying six pairs of spokes, the outer ends of each pair of spokes being terminated by a cast iron block cast on them. To these blocks are riveted two rings of flat bar iron, which serve to connect the outer ends of the six pairs of spokes as shown. The blocks at the outer ends of the spokes are of such dimensions that they, with their connecting rings, just work freely within the webs of the two T-iron rings of the outer tire, as represented in Fig. 3.

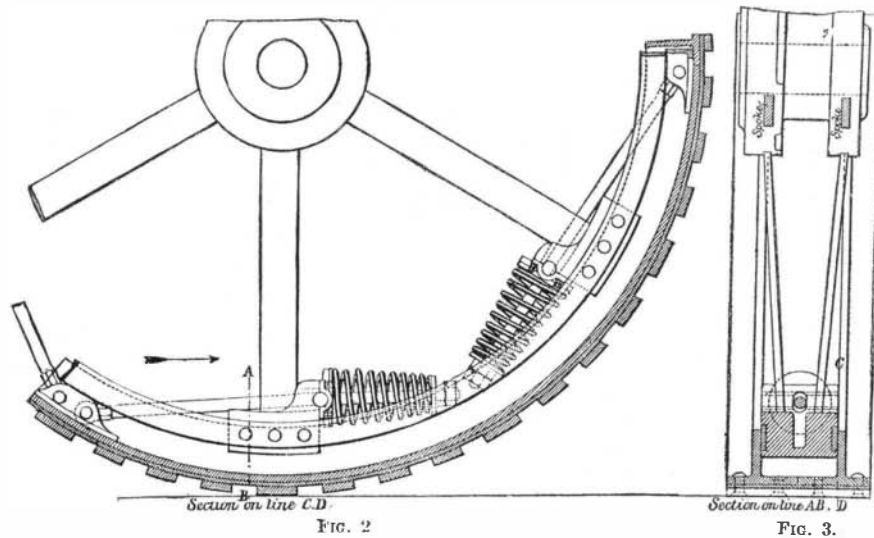
At three points in the inner circumference of the outer tire there are riveted to the latter pairs of angle irons, to which are jointed the links or bars on which the springs act. There are six of these links, which are coupled by pins to

the three pairs of angle irons just mentioned, and each of which passes through the block at the end of the adjacent pair of spokes, and has threaded on it one of Timmis' helical springs, as shown. Each spring exerts its thrust on a base plate which is pivoted to the corresponding block at the end of the spokes, while the compression of each spring can be adjusted by means of the nuts at the end of the bar on which it is threaded. The whole arrangement, which is very simple and workmanlike, will be readily understood on examination of the perspective view of the engine and

engine was taken through the city of Rochester and up Star Hill—a hill which nature has kindly provided at a convenient distance from Messrs. Aveling & Porter's works, apparently to facilitate the testing of traction engines. This hill commences with a short gradient of 1 in 75, followed by 110 feet of 1 in 22, then 110 feet of 1 in 14, then 114 feet of 1 in 16, then 135 feet of 1 in 14, then 264 feet of 1 in 16, then 107 feet of 1 in 11, and finally 221 feet of 1 in 55. Altogether the hill is 1,137 feet in length, and rises 63 feet, giving an average gradient of almost exactly 1 in 18; but of the total rise 58 feet is effected in a distance of but 841 feet, so that for this length the average gradient is 1 in 14½. Up this severe hill the engine took its load without hitch or trouble of any kind. Both when hauling this load up Star Hill and in passing over paved streets in Rochester, the action of the spring wheels was highly satisfactory.

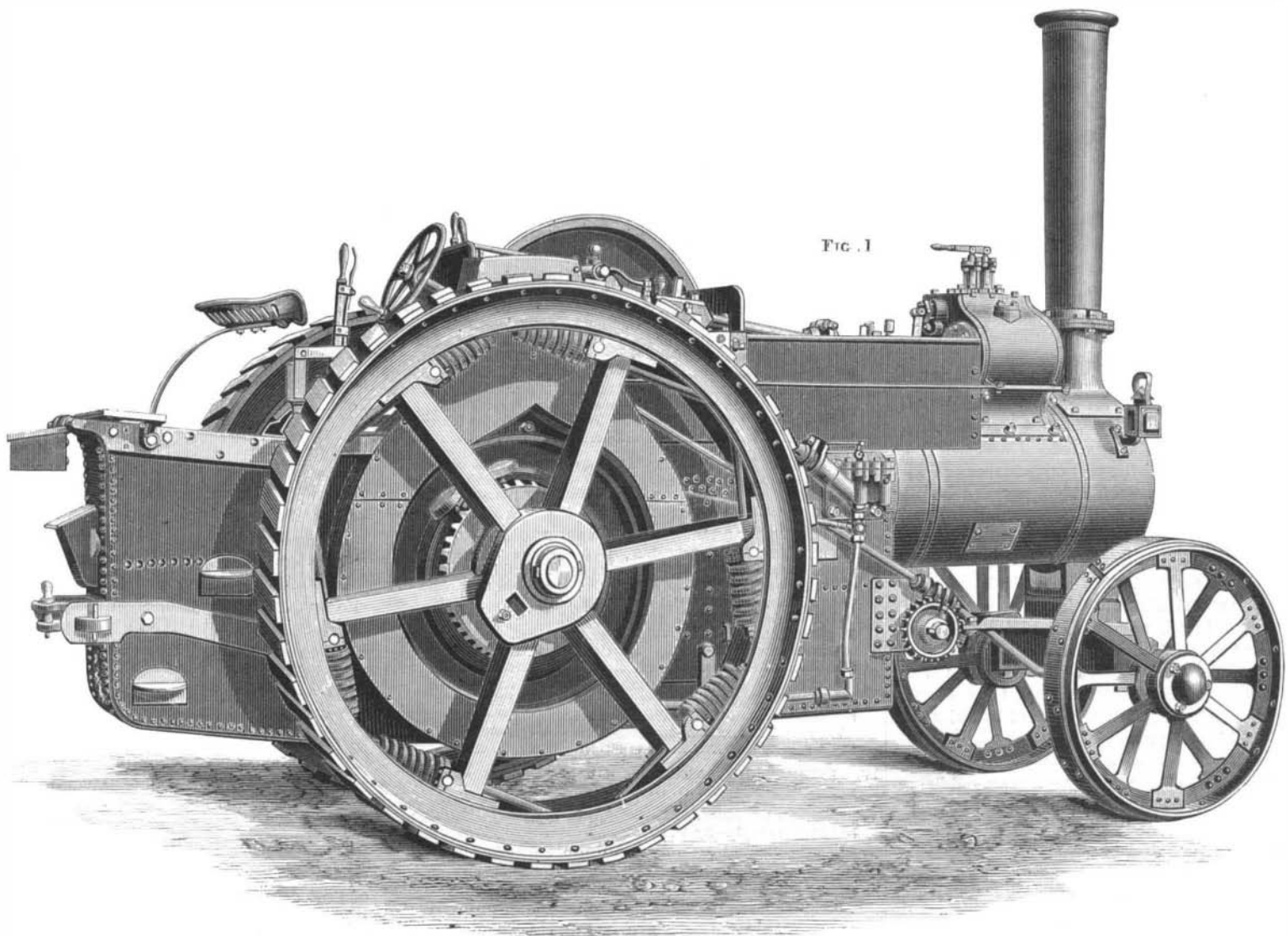
On the return of the engine the wheels were severely tested by running the engine over timber laid across the road, "jumps" 8 inches to 9 inches high being thus repeatedly taken, and notwithstanding that the wheels after passing over the timber dropped the full height on the hard road, they sustained no injury whatever. Further experiments were then made to ascertain the extent to which the springs yielded under different conditions of working. For this purpose an iron pointer was securely clipped to one of the spokes and made to bear with its point on the

web of one of the T-irons of the outer tire, so as to scratch on this web a diagram showing the amount of movement of the inner wheel within the outer tire. With the engine moving alone over a fairly good road it was found that this diagram showed a radial and circumferential elasticity of ½ inch, the curve traced by the point being almost a perfect circle. The engine was then coupled to one of Messrs. Aveling & Porter's 15 ton steam road rollers, and the brake of the latter was put hard on, while its engine was partially reversed so as to make the resistance just as much as the



the sectional views of the wheel already referred to. We have had, says our contemporary, an opportunity of witnessing some interesting trials of the engine from which our perspective view has been prepared. As we have said, it is rated by Messrs. Aveling & Porter as a six-horse, and it weighs in working order a little over 10 tons. On the day to which we refer a trip was made with this engine and three traction wagons loaded with scrap iron, the three wagons with their contents weighing 23½ tons, making the gross load, including engine, over 33½ tons. With this load the

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IMPROVED TRACTION ENGINE WITH SPRING WHEELS.

traction engine could overcome. Under these circumstances the diagram traced on the outer tire became nearly triangular, the form being that of a triangle with curved sides, while the radial and circumferential elasticity increased to slightly over 1 inch.

Altogether, the action of Messrs. Aveling & Porter's spring wheels was throughout the experiments most satisfactory in every way, and the arrangement is one well fulfilling the requirements of the problem to be dealt with. One special feature in the wheels worth notice is the ease with which the springs can be adjusted so as to put them in a greater or less state of compression—thus making the whole wheel more or less rigid, as may be desired.

#### The Weather.

It is so common to judge the weather we have most recently experienced, or are just passing through, as a great deal more remarkable than any we have before known, that it is sometimes profitable to look over the records giving the exact data. The past winter, in the neighborhood of New York city at least, has called forth a great deal of comment from the number of its unpleasant days. On comparing the figures with those of a year ago, we find that of the first seventy days of 1883 there were forty-four in which either snow, rain, or sleet was precipitated, while during the same period of 1884 there were only forty-one days. What, then, is the cause for the popular verdict against the present season? There are several explanations. In the first place, there was greater variety last year. Rain was varied by snow, then by freezing cold, and pleasant weather came in at intervals, so that the spells of bad weather were not long and tedious. This year rain has predominated, and snow was incidental. From February 4 to 9 inclusive, there were six consecutive rainy days, and from March 1 to March 21 there were only five days without rain, and all were cloudy. The water precipitated this year has been largely in excess of last year's figures, and there has undoubtedly been more of it in the atmosphere on those days when there has been no actual rainfall at all. The precipitation of water in January and February, 1884, was 9.97 inches, against 7.80 inches during a like period a year ago. From March 1 to 21, 1883, the precipitation was 0.98 inch, against 3.44 inches for the corresponding time this year, making the total rainfall to March 21, 1884, 13.41 inches, as compared with 8.78 inches for the like time last year. It is a fact that since January 1 the sidewalks in New York city have not been dry for twenty-four consecutive hours. For these reasons the Signal Office figures and the oldest inhabitant's surmises, though apparently contradictory, are not so far apart as they would seem at first sight.

#### Atmospheric Waves.

Professor Soerster, director of the observatory of Berlin, and others, have remarked the existence of sudden harmonic changes in calm, steady weather occurring during the month of August last, and have traced their connection with the eruption of Krakatoa on August 27. The chief shock of this eruption was felt about 7 A. M. on that day, and the resulting atmospheric wave appears to have traveled over the world. The first wave was felt at Berlin about ten hours later, giving a velocity of propagation of 1,000 kilometers per hour, or nearly the speed of sound. About sixteen hours later a second disturbance was felt, probably due to the wave which did not come direct, but round the other side of the world, by America. For the same speed of propagation the time would correspond to the distance in this case. Moreover, thirty-six hours after the first disturbance at Berlin, a third was felt of a weaker sort, and this corresponds again in point of speed. Lastly, a fourth and weaker disturbance was observed thirty-four hours after the second wave, the acceleration in this case being due, perhaps, to atmospheric currents from east to west.

#### William Sturgeon.

A most remarkable man was the electrician William Sturgeon, whose discoveries and inventions in electricity may be traced under modified forms in many of the principle electrical apparatus now in use, but whose claims to honor are well nigh if not quite ignored. He was born in 1783, and from first to last his life was one of labor and poverty, yet it is marvelous how much excellent work he performed in the trying circumstances. Beginning life as a private soldier, in spite of all the difficulties inherent in such an existence, by great industry he acquired considerable proficiency in science, not neglecting either the literary side of education. His contributions to science, commencing in 1823, are about fifty in all, published in the *Philosophical Magazine* and the "Annals of Electricity," all bearing on his favorite study—electrical phenomena. To Sturgeon we are indebted for the soft iron electro magnet, the commutator, and the amalgamation of the zinc plates of batteries, and numerous electrical investigations.

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#### THE PATENT BILLS BEFORE CONGRESS.

The efforts lately made by manufacturers and inventors to arrest the further progress of the destructive legislation concerning patents, have had this much of good effect in the Senate, namely: instead of rushing through the bills with railroad speed, as did the House, the senators have held back; instead of precipitate action they have wisely given a hearing to some of those whose property rights are endangered; still another hearing, it is believed, will be given. This concession has been gained chiefly in consequence of criticisms of the press and the receipt by senators of personal letters and protests from many different parts of the country.

In an emergency of this kind members of Congress are very greatly influenced by the appeals and information received directly from individuals.

We again entreat the friends of home industries, editors, manufacturers, patentees, inventors—all who favor the progress of the useful arts and the maintenance of the patent laws—to persevere with their efforts.

We urge them to adopt all proper methods they can command; especially to write protesting letters, without delay, first to their Senators, and next to their Representatives in the House. Each individual should consider it a personal matter, and not wait for some one else to write or act. Every letter, every telegram sent, every effort made, will help, and may prove of importance.

For the convenience of readers we republish the numbers and general nature of some of the bills before the Senate.

House bill 3,925, introduced by Hon. Mr. Calkins, of Indiana, provides substantially that if the inventor or owner of a patent shall dare to attempt to sustain his rights by bringing a suit against infringers, he shall recover no costs, and shall pay to the infringer's lawyer a counsel fee of \$50. This bill was passed in the House of Representatives by an enormous majority, on January 21, and is now before the Senate for concurrence. The members who voted for it apparently regard it as a very upright proceeding to encourage the inventor to reveal his invention by passing laws to give him a patent, and then passing other laws to deprive him of the benefit of said patent. This is the way Congress exemplifies integrity and fair dealing before the people.

House bill 3,934, introduced by Mr. Vance, of N. C., provides substantially that any person may use any patented article he pleases without liability, but shall become liable after receiving notice that a patent exists; and may then require the patentee to give him the use of the patent for a royalty to be named by the courts, thus robbing the patentee in the first instance and then depriving him of the control of his patent. This bill was passed by the House, January 22, 1884, by a vote of 114 yeas to 6 nays.

The full texts of the foregoing bills will be found on page 73 of the *SCIENTIFIC AMERICAN* for February 2.

House bill 3,617, introduced by Mr. Anderson, of Kansas, is as follows:

"Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That section forty-eight hundred and eighty-four of the Revised Statutes is hereby amended by striking out the word 'seventeen' and inserting in lieu thereof the word 'five'; and that all acts or parts of acts inconsistent herewith are hereby so modified as to be made consistent."

This bill has not yet passed, but perhaps soon will be by a great majority, as there is no member in the House who has so far ventured to say a word in protest or speak in favor of inventors or the present patent system.

In the Senate the bill introduced by Mr. Voorhees, of Indiana (S. 1,558), provides in effect that all patents shall be free to the public. This bill caps the climax; it has not yet passed; but soon will be if the members of the Senate share in the views of the House majority.

The following is the text of Senator Voorhees' bill: S. 1,558. "Be it enacted, etc.—That it shall be a valid defense to any action for an infringement of any patent, or any suit or proceeding to enjoin any person from the use of a patented article, that the defendant therein, or his assignor, purchased the patented article for use or consumption, and not for sale or exchange, in good faith and in the usual course of trade, without notice that the same was covered by a patent, or without notice that the seller had no right to sell such article; and in all such cases notice received after such purchase shall not have the effect to impair in any way the right of such purchaser as absolute owner."

Let no one be backward in expressing, in a decisive way to Senators, their views upon these obnoxious bills.

In addition to personal writing to members, individual effort might accomplish much by securing the passage by associations, societies, municipal governments, and State Legislatures, of resolutions appealing to Congress not to enact these suicidal measures.

On the 20th inst., the Chamber of Commerce of the city of Pittsburg, Pa., passed resolutions protesting against the passage of various hostile patent bills now before Congress, and requested Senators and Representatives to give them careful consideration, and endeavor to prevent legislation which will discourage invention.

We give these resolutions elsewhere. In another column we also publish a very interesting article from the *Kansas City Centropolis*. This contribution, we learn, is from the pen of Prof. John D. Parker, the well known lecturer on science.

Before this number reaches our subscribers a convention of inventors and all who are interested in the development of the useful arts will be in session at Cincinnati. From their deliberations we hope for good results.