remarkable personages were born in Siam in 1811, and constituted part of a family of fifteen children, several of whom were twins, though none save these two were in any wise deformed. Chang and Eng, however, were linked together by a fleshy ligature, which was about a foot in length, two inches broad and four inches thick. Through it ran a large artery and many veins, making their circulation identical. Each brother had, however, an entirely separate existence, and, with the exception of the ligature, which was equally sensitive to both, their senses were totally disconnected.

In 1850 Barnum exhibited them throughout the country, and out of their salaries they managed to amass some $40,000. With this money the brothers purchased two adjoining plantations in North Carolina, assumed the surname of Bunker and, strange to say, married. The courtship, it is stated, was done by proxy, and the wives, English women, who had only seen their husbands once at a show in London, were selected by the twins from likenesses forwarded by an agent. At the time of their marriage the brothers were forty four years of age and their wives, who were sisters, respectively twenty-six and twenty-eight. Their domestic life is said to have been very peculiar. The wives lived in separate homes and the husbands alternated, staying one week at Chang's house and the next week at Eng's. Each looked after his plantation and other business during the weeks of his living at his own place, and the visiting brother was not supposed to interfere. The families increased rapidly, Chang having six children and Eng five; of these four were deaf mutes, though not deformed, while the rest were strong and healthy. The domestic life of the brothers was not happy, and serious difficulties occasionally took place, resulting in the estrangement of the families for long periods. They were slave owners and cruel masters, and during the war manifested strong southern proclivities. At the end of the rebellion, their wealth was very much reduced, and they again went into the show business, with only partial success.

The brothers were of medium size and of peculiarly repulsive faces. Chang was the most robust and good natured, while Eng was often sick and morose. Chang also was the mental superior, although both were ignorant and had intelligence that scarcely rose above low cunning. As they grew old, the almost certainty of the death of one resulting in that of the other rendered them fretful and nervous. While in Europe, they consulted the best physicians regarding the possibility of a separate existence; but when the ligature was compressed so that all transfusion of blood between them stopped, Eng fainted, proving that neither could sustain a separate circulation. About a year ago Chang had a paralytic stroke which rendered his health the worse of the two; and as a relief from suffering, he drank freely. His death occurred first; and the shock, or more probably the cessation of circulation, affected Eng so strongly that delirium, followed by stupor, almost immediately set in. At the end of two hours, he also expired.

## THE ONE HUNDRED THOUSAND DOLLAR CANAL REWARD.

The Canal Commission of the State of New York, charged with the duty of trying and examining the various boats that were presented last year in competition for the reward of one hundred thousand dollars, have lately made their report to the Legislature. They say that, owing to the technicalities contained in the law under which the reward was offered, they have been unable to make an award to any of the competitors. They ask that the law may be modified and new trials allowed. They report that two of the competing boats very nearly filled the requirements. These were the steam canal boat William Baxter and the steam canal boat William Newman. The requisition was that each boat should be able to carry 200 tuns of cargo besides motive power, and make an average speed of three miles per hour.

The William Baxter was built especially to compete for the prize. She is 96 feet long and 17 feet beam, and has much sharper lines than the ordinary canal boats. Her bottom is perfectly flat, and her sides, stem, and stern, vertical. The outlines of the immersed portions of her bow and stern are the same. She has an overhanging deck at the stern to protect her propellers, and with 200 tuns of cargo she draws 5½ feet of water. Her machinery consists of a Baxter upright boiler, and a pair of Baxter compound condensing engines, 7x12 and 12x12. Her boiler is 6 feet high, 46 inches diameter, and has 152 two inch flues, and a grate surface of 7 feet. She is propelled by 2 three bladed twin screws of 4½ feet diameter and 4 feet pitch. The amount of coal consumed in running from Syracuse to Utica, a distance of 56 miles, was 830 pounds.

The William Newman has a Hubbard hydraulic propeller. She has a horizontal tubular boiler, 8 feet long and 44 inches in diameter, and a grate surface of 13 feet; and she is driven by a single 12x12 upright engine. The propeller is 4 feet 8 inches in diameter and 3 feet long. The amount of coal consumed from Syracuse to Utica was 4,500 pounds.

The time for competition has now expired. If the Legislature at its present session should renew the reward, we shall promptly inform our readers.

## THE TURNER CAR BRAKE.—APPLICATION FOR AN EXTENSION.

An application for extension of the car brake patent of Charles B. Turner, dated November, 1848, and extended in 1862 for seven years, is now before the Senate Committee on Patents. Messrs. Batcheller & Thompson, the assignees of the inventor, submit their claim on the ground that they have received no adequate compensation for the use of the device, having been opposed so strenuously by railroad combinations throughout the country that they have been compelled to expend in litigation about as much money as they have received.

The railroads, which are represented by Mr. Wm. D. Bishop, President of the New York and New Haven R. R. Co., and Mr. Joseph Howard, counsel for the Pennsylvania R. R. Co., contend that adequate compensation has been received, and that the patent is invalid by reason of a prior invention. This last assertion seems to be in direct variance with Judge Drummond's decision in a recent infringement suit brought by the assignees against certain railroads in Illinois. A master in chancery reported adversely to the defendants, who had associated themselves together, and found heavy damages. The railroads filed a bill of exceptions, but the opinion of the appellate court, as delivered by Judge Drummond, sustains the master in every particular. The decree is that the patent is good and valid; that the inventors have never neglected or abandoned such patent; that the instrument covers the connecting of all the brakes of a car with windlasses, so that a brakeman, by operating any one of the latter, can apply all the brakes to the wheels; and that the Stevens brake, used by the defendants, contains all the covered combination.

The railroads, as represented before Congress, are strongly opposing the extension; and after the presentation of the case by Mr. S. D. Cozzens, of counsel for Messrs. Batcheller & Thompson, a postponement was obtained by Messrs. Bishop and Howard, in order to afford necessary time for consultation as to the nature of the reply they will make to the application. The matter, therefore, is adjourned for some days.

## THE NEW ENGLAND ASSOCIATION OF INVENTORS AND PATENT OWNERS.

*To the Editor of the Scientific American:*

Many of your subscribers were surprised to see, in your issue bearing date January 10, 1874, a leading article mentioning the New England Association of Inventors and Patent Owners in a spirit tending to mislead your readers. I would ask you to amend what evidently proceeds from insufficient information. I have sent you a prospectus of the Association, and trust that its perusal will lead you to see that its objects are neither as limited nor as selfish as you state them to be.

The objects aimed at are "to collect and diffuse statistics tending to demonstrate the usefulness of patent laws, and the growth of our arts and manufactures under their influence; to draw from the Congress of the United States such recognition of their general value as shall secure a just and liberal basis of patent protection; to bring together all persons interested, and reconcile their differences, and to take such action as may best promote the general prosperity of the classes represented in its membership."

As no inconsiderable number of your subscribers are members of this Association, and there seems to be no question of its being able to be put to good uses, and assuming that you desire to give only reliable intelligence to your readers, I would ask, on behalf of the Association, that you correct the impression created by the strange *animus* of the article in question. Very respectfully,

THEO. A. DODGE, President of the Association.

REMARKS BY THE EDITOR.—In respect to the above association, our language was as follows (see page 16 of our current volume): "The objects of this Association, so far as we can gather them from the proceedings, are to render mutual aid and benefit to the members in the management of their patents, to secure the extension of their several patent monopolies, compel the payment of fair prices for patents by railway companies, and in other ways to promote the general prosperity of the country."

We have received the prospectus above referred to, which consists of a report signed by Mr. Dodge, upon the expected scope of the Association. It is a very creditable document, and contains various excellent suggestions, to which we shall hereafter have occasion to allude. It does not, however, purport to be a statement of the proceedings of the original meeting of the Association, and has therefore no bearing upon the question of the accuracy of our remarks concerning those proceedings.

We think, if Mr. Dodge will refer to the reports of the meeting once more, as contained in the Boston daily papers, he will find that our statement was substantially correct. The "strange *animus*," the impression of which Mr. Dodge, on behalf of the Association, asks us to correct, refers, we presume, to the objections we presented to the Hill resolution. This resolution covered, indirectly, as we thought, an endorsement by the Association of one of the Vienna propositions, to the effect that governments ought to fix the prices at which patents shall be sold; in other words, that the inventor, after he has received a patent, ought to be deprived of its control. Now, if there is any one point which imparts a distinguishing excellence to the American patent law over the continental system, it is that we give *to the inventor* the free, untrammeled right to make use and dispose of his patent during the entire term for which it is granted, according to his own best judgment. We permit no government interference with him, and have no sneaking government detectives to dog his footsteps, as in some parts of Europe. The mere suggestion of an alteration of our patent laws, to authorize such interference, is abhorrent to the feelings of American inventors, and contrary to public policy.

These views of ours we believe to be fully in accord with the feeling of the great mass of our readers. Mr. Dodge is mistaken if he supposes that many of our subscribers, in the Association, were surprised at seeing the expression of them.

In so far as the New England Association shall actually *do* anything to promote the interests of inventors, or encourage the progress of the useful arts, its members well know that they may always count upon us as being with them, heart and soul. But when they go for the approval, even indirectly, of government interference in the sale of patents, we are not with them, because we believe it to be a wrong policy.

## THE PHILOSOPHY OF THE SAND BLAST.

At first sight, the cutting of a diamond or other hard substance, by another so much softer as sand is, seems flatly contradictory to common experience. Still, to any one who has ever fired a rifle ball against a rock, the fact that a flying soft body will bruise or crush a harder one is neither surprising nor new. The possible perforation of a pine board by a tallow candle, fired from a musket, is an illustration of the same fact, familiar to every school-boy. In the sand blast, however, the effect seen is so manifestly disproportionate to the momentum of the individual particles that the explanation usually given in the grosser cases fails to hold good. Grains of sand, of very unequal size, appear to do precisely the same work when moving at the same rate, thus directly contradicting what has hitherto been an unquestioned law of impact.

Whence arises the discrepancy between what is and what might be expected? To answer this question, an English investigator has reconsidered the laws of impact, and finds that one of great significance and importance has heretofore been entirely overlooked. It is this: At the moment of first contact, the pressure between impinging bodies is independent of their size.

This law has been undetected heretofore, simply because the laws of impact have been considered mainly with reference to the centers of gravity of the bodies, while little or no attention has been paid to the points of impact and what goes on there between the instant of first contact and the time when the center of gravity is changed. Even with the compacted bodies, it takes time for the pressure to extend to the inner particles.

Hence, on the instant of impact, it is only those particles in contact which are affected, and the rest of the body might be removed without altering the effect. In other words, the effect of impact is independent of the quantity of matter behind the particles which actually impinge.

That the effect of the sand blast is—as this law indicates—a battering, not a grinding, action is clearly shown by the microscope. A polished glass surface, that has been exposed for an instant to the blast, is spotted with points from which scales of fractured glass have been broken away in irregular direction. Each spot appeared as if a pellet of glass had been driven in by the collision, and the wedge-like action thus set up had driven away the surrounding glass. The polariscope confirms this inference. When thus tested, each spot shows a colored halo, proving that the surface of the glass is under strain.

## SCIENTIFIC AND PRACTICAL INFORMATION.

### THE VULCANIZATION OF HYDROCARBON COMPOUNDS.

In treating bituminous substances, such as asphaltum, grahamite, petroleum residuum, the different mineral resins, coal tar, etc., with sulphur, chloride of sulphur, or sulphur in combination with various bases, such as sulphuret of iron, etc., a definite chemical compound is formed, differing from its constituent parts in many material respects, being harder, tougher, and more capable of resisting heat. The sulphur should be in just sufficient proportion to form this compound, as an excess would mix mechanically with the mass and render it too brittle for use. Difficulty is usually experienced in determining the proportion of sulphur, as it varies according to the hydrocarbon used. To overcome this difficulty and to avoid all danger of having an excess of sulphur, it is best to use in addition some metallic oxides (such as litharge, for example), which will combine with any free sulphur, forming a metallic sulphuret. The hydrocarbons are first heated till the water is entirely evaporated, and the sulphur, chloride of sulphur, or metallic sulphuret, is then added. The sulphur may be dissolved in bisulphide of carbon or any of the ethereal or fatty oils, or it may be mixed directly with the mass.

### ANTIMONY BLUE.

C. Kraus obtains this color by boiling tartar emetic with yellow prussiate of potash, and adding hydrochloric acid. The antimony does not enter into the composition of this color, but merely facilitates its formation.

### WHITE COAL.

A new kind of fuel has recently been discovered on the Australian continent, which has received the name of white coal. It consists of felted vegetable fibers, like peat, which contain, interspersed between them, fine grains of sand. It is easily combustible and burns with a light flame. The white coal covers large tracts, requiring no mining, and is already used in large quantities as fuel.

CYMOGENE (? chymogene) writes to say that our correspondent, I. S. Peet, is wrong in adding rhigoline to the list of products of coal tar, as this body does not exist in the coal tar, but belongs to the highly volatile portions of petroleum, being second in the list.