sistants. The deceptions of the whole scheme are so transparent that it hardly seems credible that persons of sane minds can be found who are willing to invest. Nevertheless, we hear from a reliable source that quite a number of well known business men have invested money in the scheme, and in one instance we were told so by the party himself. He had paid five thousand dollars down, and fully believed the thing to be a great discovery, and expected to realize a large fortune from his investment. On all other subjects this gentleman was rational and intelligent; but in respect to the Keely motor he was badly hallucinated. He was present at the trial above referred to, saw 2,000 lbs. on the gage, and came away perfectly satisfied.

The question is asked: How could so great a pressure as 2,000 or 10,000 lbs. per square inch be produced, allowing that it really was exhibited as stated? We think that any ingenious mechanic, by means of a hydraulic jack and a small pipe, could readily produce and exhibit such a pressure, and could, by turning a faucet, drive a whirligig for the space of sixty seconds, or from 9:08 P. M. to 9:09 P. M., as the learned counsel gravely reports.

Keely, it will be noticed, talks about his studies regarding the force of columns of water, and describes the use of water pressure in his "generator," "multiplicator," "receiver," etc. Well, now, Keely might, if he wanted to, get up an honest show of air pressure by arranging a series of short water tubes so as to concentrate the combined weight of their water against air confined in a suitable chamber. Allowing, for example, that he had ten communicating water tubes, each holding a cubic foot or 62 lbs. of water, he might, by turning a faucet, fill the tubes from the hydrant, and concentrate 620 lbs. weight on the confined air, which, if conducted to a gage, would indicate 620 lbs. pressure; this air might drive a small wheel from 9:08 P. M. to 9:09 P. M.; it would moreover be a cold vapor, without smell nor taste; it would blow out a candle, but not burn; there would be no noise except that of running water; there would be no residuum save air and water; no heat, electricity, or chemical action would be involved.

A curious arrangement of water and air tubes, in which, by turning faucets, the water weights are concentrated, producing pressure, was illustrated and described in the SCIENTIFIC AMERICAN of April 4, 1868, page 212. It was patented by James R. Cole, of Tennessee, December 10, 1867, as a water elevator. It might be bad for Keely, if he should prove to be an infringer of this patent.

There is also a patented arrangement of mercurial tubes for concentrating the weight of mercury and air columns in an analagous manner. We allude to Quinn's patent steam gage, 1866. It is possible that Professor Rand, Professor Haswell, Chief Engineer Rutherford, U. S. N. Chief Engineer Wood, U. S. N., and other advocates of the Keely motor, are not acquainted with these devices.

One of the strangest developments connected with the Keely motor is the implicit faith which many gentlemen, in this community, of tried experience and business capability, have given to the enterprise. They have yielded not only faith but their money. We can account for this only by supposing that they mistake mere *pressure* for motive power. But mere pressure is not motive power, it is simply a resultant of motive power. A very slight motive power, if sufficiently long continued and properly applied, may produce the greatest pressure. A weight of only a single pound, hung upon the extremity of a suitable lever, is sufficient to produce a pressure, at the opposite end of the lever, of 10,000 lbs., or more, to the square inch. To persons not familiar with the laws of mechanics (and this, we think, is probably the situation of most of the Keely investors), the exhibition of a gage, showing 10,000 lbs. pressure, might readily be regarded as proof positive of an enormous power behind the gage; whereas the actual power, concealed from view, might be only a weight of one pound.

In cases of this kind, when a body is lifted or a pressure produced, the inquirer should take pains to ascertain what the extent of the original moving power or weight is. If this precaution be taken, the falsity of motors like Keely's may be at once detected. In the example of Keely, the certificate of Collier shows that a hydrant force of 26½ lbs. to the inch is always required to run the machine. This force, if applied to a common wheel or engine, would produce a considerable amount of constant mechanical power. But the moving force is nearly all wasted in Keely's device, for he is only able to drive a toy engine for a minute or two at a time. This does not look much like driving a train of cars from Philadelphia to New York, or crossing the ocean without the consumption of coal.

THE BASTIE PATENT GLASS.

We publish on another page an account of some recent experiments with this novel material, together with the inventor's account of the process as contained in his patent, from which we also give a drawing of one of his furnaces. The apparatus consists of a chamber for heating the glass very hot; and while in this condition, it is quickly plunged into a hot tempering bath of oil, wax, resin, tar, or pitch. This seems to be a simple and easily executed process, which if practically effectual, ought not to increase the expense of the glass but very little. The owners of the patent claim that 5 per cent above the ordinary cost of glass will cover the expenses of the improvement. On this point, we shall hope, ere long, to have further information.

It would appear that Professor Egleston, of Columbia College in this city, who has been employed by the patentee to show up the merits of the new glass in public, and who has been very successful in this part of the matter, has not, during the two months that he has been engaged, made any personal experiments with the simple process itself. All that he has done is to exhibit glass, brought from France, furnished by the patentee, testing them with samples of common glass picked up in the shops here. Whether the patent glass tried by Professor Egleston was in part strengthened, as glass sometimes is, by ingredients and treatment used in its manufacture, or consisted only of common glass, subsequently treated by the new process alone, the experimentor was unable to say. The statements of the patentee in respect to the economy and practicability of improving common glass, on a commercial scale, have yet to be demonstrated.

The patentee's agents in this country deny that the alleged invention of Mr. Pieper, mentioned in an item in our paper of June 12, had the effect to arrest the negotiations for the sale of Bastie's patent in Germany. On the contrary, they inform us that the sale of Bastie's process to the German glass makers was concluded on May 9th.

A NEW FORM OF PATENT LITIGATION.

In a recent article, commenting upon the relative number of patent litigations in England, where they grant a patent to every applicant, without official examination, and in this country, where we reject over five thousand applicants for patents yearly, and employ a standing force of five hundred officials to examine, or assist the examiners, we showed that in England, out of thirty thousand law cases yearly, only eight were patent litigations. We further intimated that a very large amount of patent litigation, of a character wholly unknown in England, was carried on here, and was a necessary adjunct to our present system. We allude to the litigations before the Patent Office, such as re-examinations, appeals to the Board of Examiners, interferences, appeals to the Commissioner in person, appeals from the Commissioner to the District Court, etc.

A new wrinkle in this sort of litigations, and a new direction for appeals, has lately appeared, which seems to indicate that the time has come when Congress should, by the adoption of wise legislation, put an end to this whole business of Patent Office quarreling.

Among other duties of the Secretary of the Interior, he is required to sign all patents after they are prepared, passed, and approved by the Commissioner of Patents.

On a recent occasion, when the Commissioner, after a long and full argument of the matter before him, had decided the case of Prescott *vs.* Edison, in favor of Prescott, ordering a patent to issue in the joint names, the defendant applied to the Secretary of the Interior and petitioned him not to sign or issue the patent. The subject of controversy was a telegraph apparatus. The Secretary granted the request, and decided to hear the argument. This was on the 20th of March, 1875, and no decision has been as yet reached. Meantime the contending parties have marshalled their legal forces before the Secretary, consisting of six of our most able and expensive lawyers, have argued and re-argued, and have filed scores of pages of printed fol-de rol upon the subject, for the Secretary's consideration. If one dissatisfied applicant may thus occupy the Secretary's time, all applicants ought to have the same privilege. If the Secretary may nullify one legitimate decision of the Commissioner of Patents, he may nullify all.

The money costs of this one litigation before the Commissioner and the Secretary are stated to have reached, at the present time, over fifty thousand dollars. Jay Gould, it is said, is an interested party on the one side, and the Western Union Telegraph Company on the other. Jay is doing all he can to injure the Western Union Company by running down its stock and inflating the stock of a rival company, of which he owns the control.

This case is a little more prominent and has been more expensive than many that are litigated at the Patent Office. But it is notorious that a very large proportion of the time of the Patent Office officials is devoted, in one way or another, to these litigations, which, in the aggregate, involve great expense, but would become obsolete, as they are in England, if we were to adopt the English system of permitting the applicant to make his own examination if he so desires, but confining the duty of the Patent Office to the prompt issue of a patent to every applicant whose papers are presented in proper form.

It is alleged by the advocates of the American system that, if our official examinations and Patent Office wrangles were abolished, then the courts would be overwhelmed with patent litigations. But the experience of other nations shows that no such result would ensue. In England, as before stated, they have only eight patent litigations before the courts per annum; while in France, Belgium, and other countries, where no official examination and no Patent Office litigations take place, the number of patent cases brought before the courts is very small.

COMMERCIAL SPONGES.

It is sad to consider how much we lose in every walk of life through lack of a little observation. There are few stonemasons who, like Hugh Miller, are led to become noted geologists by noting and studying the beautiful fossils in the stones they chisel. A butcher may cut up beeves and porkers by the hundreds, or a fisherman spend a long life on the shore, without noticing the most obvious points of interest and instruction in the physical structure of his victims; and only when a naturalist calls his attention to the beautiful adaptations, which have before passed unnoticed, will he have his interest profoundly excited, which may ever after give him a new motive and zest in his work. The most of us will use sponges in an indefinite variety of ways, all our lives, without even once stopping to think how they were formed; whether they are plants, animals, or neither, or what are their history and habits.

The ordinary sponges of commerce, which we use so extensively, have but little resemblance to animals or plants, and belong to a class of organic bodies concerning the affinities and proper classification of which there has been much doubt. And this doubt has led naturalists to apply the question-begging appellation of zoöphytes, or plant animals, to these and similar organisms. They are now generally considered members of the animal kingdom. The parts we use are the mere skeletons, composed of a kind of horny substance. The animal itself is a soft, jelly-like, amorphous mass, which fills up all the intercellular spaces, lines the tubular canals, and forms a jet black or sometimes a dark purplish skin on the outside, covering the whole skeleton, excepting the larger openings, which project beyond its general surface. In this form the sponge exists in the water, and, out of its native element, is hard and glistening on the outside, and very strongly resembles a piece of liver.

The mode of life in this low order of existence, which is regarded as a compound animal, is very simple, and we would be disposed to call it extremely uneventful. Sponges grow, by a kind of lichen-like root, to some foreign object on the sea floor, and never move from their position; they have no power to contract or expand their body as a whole, or any part of it: and they are quite insensible to every sort of irritation. Their only power seems to be that of absorbing large quantities of water, which they again yield up on pressure without any injury to their texture. The water, which permeates their whole mass, and maintains a constant circulation through it, keeps the skeleton soft and elastic, brings to the animals the air and food on which they subsist, and carries away waste matter from the body.

On examination of a sponge skeleton, it will be seen that the porous surface is finer and of closer texture than the interior, that there are large apertures scattered indiscriminately over the surface, and between these are much finer openings, covering the complete outer surface of the sponge. The latter are called pores, and serve as channels of entrance to the water, which, after circulating through the body by means of the tortuous and branching canals which make up its inner skeleton, passes out at the larger openings. These chimney-like apertures are called *oscula*, but the name is a misnomer, for they are, in reality, vents. They vary in number in the different species, and are sometimes reduced to a single one. By what force the water is made to circulate through the sponge mass is not definitely known. Some have attributed it to vibratile ciliæ, planted within the porous canals which, by their motion, create a circulation in the water. Others ascribe it to the principle of osmosis, by which membranes of all animals, and many other porous substances transmit fluids and gases according to their density and power to act on the transmitting substance.

When obtained for commercial purposes, the animal matter can be removed by soaking it a long time in salt water and then—after it is rotted by this means—rinsing it out. This leaves the horny skeletons just as we use them.

The finest sponges of commerce come from the Mediterranean sea. Our best bath sponges are doubtless from this locality, but the coarser sponges we see most commonly are largely from the coast of Florida or the Bahama Islands. Sponges are found abundantly in tropical waters generally, and perhaps nowhere more abundant than in the seas of the Australian islands. They gradually decrease in numbers towards the colder latitudes till they become entirely extinct. They vary much in shape. Some are beautifully shaped like a vase, others are semi-cylindrical, others nearly flat like an open fan; some are branched like the opened fingers of a hand, and are called glove sponges, and in others these branches seem to be reduced to only one, which is shaped somewhat like a club. These different shapes may belong to one species, and the differences are due, so far as known, to the fact that the first mentioned are found in deep water, and they grade, in the order described, up to the last, which grow in much shallower water.

Sponges are not confined to recent seas, though the commercial ones are not known to have existed earlier, because the keratose matter furnishes hardly favorable conditions for petrifaction. In the oölite and chalk formations, sponges containing flinty spicules were very abundant; and in most of the earlier formations, large sponges containing calcareous spicules abounded. These very closely resemble corals, and have been mistaken for them by some of our best geologists. The spiculæ or needle-shaped particles, which are often microscopic in size, are not thrown in without order, but are arranged to support the skeleton. The horny sponges do not secrete or deposit spicules, but these are sometimes found within the skeleton in broken and disordered form, which shows they were taken in from without.

There is an elastic sponge, as it is called, that is somewhat largely used now as a substitute for curled hair in stuffing beds, cushions, car seats, etc., but this is an entirely different thing from the sponge of commerce. Before it was used for this purpose, it was a worthless sea grass, growing abundantly among corals in rather shallow water.

Terrible Earthquake in South America.

It is reported that an appalling earthquake has lately taken place on the Venezuelan frontier of New Grenada. The destruction was severest in the Valley of Cucuta, in the province of Pamplona, latitude 7° 30′ N., longitude 72° 10′ W. It is said that 16,000 lives are lost by the calamity.

A PUTTY of starch and chloride of zinc hardens quickly, and lasts, as a stopper of holes in metals, for months.