tail, traveling from place to place." The large class of wholesale peddlers, carrying supplies of crackers, cigars and other specialties to country merchants, do not seem to be included under the definition; and yet the exemption in the same section, permitting certain classes of manufacturers to peddle their wares "at wholesale" [*i. e.* to be sold again] seems on the other hand to imply that *other* goods may *not* be carried about for sale to dealers without a peddler's license. Manufacturers and producers of agricultural implements, garden seeds, fruit and ornamental trees, stoves and hollow ware, brooms, wooden ware, charcoal and gunpowder, are exempt from special tax for selling their goods from place to place, at wholesale.

Again, if B, in his capacity as agent, itinerates, soliciting orders for A, but not carrying the goods to be sold, he becomes a commercial broker, provided he acts for a commission, or for different parties, and not as the simple employé of one party. If however, he sells the goods directly, from his own hands and not from A's, the above instruction 41 shows that he may send his salesman to solicit orders, and if so of course he may solicit them himself, without either a peddler's or a broker's license.

In regard to the second question, it is evident that any manufacturer may deliver goods previously ordered of him, no matter by what mode of delivery, without being a peddler. The distinction of a peddler is not that he employs his own vehicle instead of another's, but that he employs a moving vehicle to sell goods from. If C sends or carries only sold goods to those who have already purchased them, he is not a peddler, but if he should carry also spare articles for those who wish to buy them on the way, he would become one.

Correspondence.

The Editors are not responsible for the opinions expressed by their correspondents.

Action and Re-action.—The Measure of Force.

Messrs. Editors:—I wish to say a few words in reply to the strictures on my previous communication by "A Subscriber," (page 217 current volume of the Scientific American.) It seems to me that he practically begs the question, as he merely cites a precisely similar case to that already considered, calling it a *demonstration* of the disputed principle that force is measured by the space through which it is applied. My position is that there are two entirely different species of quantity to be measured. One of them I consider to be "absolute force," whether correctly or not is the point in dispute. It is measured by the number of equal increments acquired when a body is freely acted upon by a uniform force, as when gravity acts upon a falling body. In other words, in a body containing a given quantity or unit of matter, it is measured by the time the impelling force acts upon it, or what is practically the same thing, by the velocity imparted. This velocity is simply a condition of the body, indicating that it has a certain amount of force associated with it, and it is an absolute measure of that force.

The other measure is of work done or to be done, and is only a relative measure of space effect during the expenditure of force. The foot pound is a familiar unit of this kind of measure, but it can only be applied as a measure of space effects and not of the simple expenditure of force. The number of foot-pounds which a moving body is capable of raising against a uniform resisting force, undoubtedly varies as the square of its velocity, but it is far from being a logical consequence that the absolute force associated with the moving body is in the same ratio. Let us see. A body falling freely one second, acted upon by terrestrial gravity, traverses a space of 16 feet and acquires a velocity of 32 feet, just as the ball in the long gun, cited by your correspondent, is supposed by him to do. But let us suppose, in both cases, that the impelling force is entirely removed at the end of the first second and that the body continues to move freely. Its acquired velocity will carry it, without expenditure of force, 32 feet in the next second, at the end of which it will have passed over 32+16=48 feet, instead of 64 feet as it would if the force were not removed, so that the distance due to the impelling force during the last second in 16 feet, or the same as in the first second. The same reasoning will apply to any number of seconds or other units of time. Equal increments of force are therefore added in equal times, and the entire force is in proportion to the time the impelling force has acted, or to the final velocity. In the case of the gun and ball, your correspondent admits that the intensities of action and re-action are equal during each successive instant, and it inevitably follows that their entire sums must also be equal, so that the force applied is equally divided between the gun and ball, though the amount of work done, or space effect, is unequal.

Work, then, is composed of force and space, and its unit, the foot pound, is made up of both. However valuable when used in a proper manner in practical mechanics, it cannot be set up as a unit of pure force, without involving the absurdity of supposing that gravity and other uniformly acting forces do not act uniformly but with a constantly varying power dependant upon the velocity of the body acted upon, and increasing immensely with that velocity. The unit of work is just as valuable, practically, if we do not insist upon such an absurdity. We have therefore two units of measure, one being the unit of *force*, proportioned to the simple velocity, and the other a unit of *work*, proportional to the square of the velocity, or to the space traversed. All the treatises on mechanics which I have seen give the first as the measure of momentum or "quantity of motion," while the quantity measured by the latter is variously termed "vis viva," "work," "energy," "kinetic energy," etc. It seems to me however, that if our ideas upon the subject are clear and distinct, the two words force and work are fully adequate to designate the two different kinds of quantity.

The subject of this discussion seems to me to have a somewhat important bearing upon the investigation of the nature of force, in relation to which many discoveries in modern physical science seem to indicate that new and important developments are near at hand. It is moreover quite important that practical men should understand the precise nature of the difference in the two measures, as it is of the greatest importance in considering among other things, the action of steam, its expansive power, etc. While I agree of course, with your correspondent, that terrestrial gravity is an absolute force, or more strictly speaking a resultant of many forces, I do not agree with him that steam is such a force. It is matter in motion, and like all expansive vapors or gases is the result of work done in separating the atoms of which it is constituted, and in storing up "potential energy." Of course the work which is done by steam, in expending the force stored up in it, is to be measured by a unit of its own kind, a unit of work and not of force. The problem of getting all the possible work from the fuel by which steam is produced, is a very important one, and needs for its solution a clear understanding of the principles involved in this discussion, as well as of the other conditions and principles pertaining to the subject.

No particular change in the "logic of events," relative to the effect of force upon matter, has occurred since the days of Newton. His views in this respect have since been maintained by the ablest writers on the subject up to the present time with very few exceptions, and the dissenting opinions seem to refer rather to names and definitions than to facts.

Henry F. Walling.

New York, April 8, 1867.

A New Dryer for Raw Oil.

Messrs. Editors:—The process for preparing linseed oil for use in paints and the arts by boiling and the addition of siccatives, has been in use for more than a century and but little improvement, if any, has been made in the result. Chemists, as well as artizans, have overlooked an important point in the boiling of oil, which is coagulation of the albumen. This takes place at the temperature of boiling water, whereby it is changed to a semi-solid form, and when the heat is raised to the point of boiling-oil the albumen chars and when dried becomes brittle. As much of the glaze and toughness of the dried oil is dependent upon the albumen it contains, it will be readily understood that many of the troubles incident to boiled oil arise from the method of preparation.

A gentleman of Boston has been for a long time convinced that linseed oil could be made to oxidize rapidly without even heating, and thereby preserve all the properties of the oil in their natural state. This subject he has made a special study for several months, and the result is the discovery of an article which he has called "siccohast." By the addition of a small percentage of this substance to raw linseed oil in a cold state, the oil is made to dry in any desired time, from four hours up to ten days, its ordinary time. It dries with certainty and with better results, flows more evenly, and has a better gloss than boiled oil, and is more elastic and but slightly discolored. It has been thoroughly tested for outside painting during the past twelve months, and is found free from any disposition to crack, like oil that is unprepared. Paint prepared with this article sets so quickly that the wood does not have an opportunity to absorb nearly as much as of raw oil. It is in a fluid state, mixes readily with linseed oil and is perfectly harmless being made of chemicals which have no detrimental effect on the oil. A. W.

Boston, Mass.

[We hope the process above alluded to is really new and useful. It has been known for a long time that the mucilaginous matter of linseed oil may be separated without boiling. If raw oil be ground up with sulphate of lead and the milky mixture be exposed to sunlight, the sulphate of lead settles, carrying with it the foreign matter, and the oil becomes clear and has admirable drying qualities.—Eds.

Explosion of a Clock.

Messrs. Editors.—Mr. A. Bahn, a silversmith, watch and clockmaker etc. of this place, has a clock of French manufacture which he has kept in his shop as a regulator for ten years. It had an enamel face of iron or steel twelve inches diameter, steel hour, minute and second hands inclosed in a case, wood frame, glass 1-16 inch thick front and sides, 5 feet high 18 inches front 6 inches deep. On the 22d Feb., 1867 5h. 30m. P. M., thermometer 60° Fah., the enamel face of the dial burst or separated from the metal to the extent of one-eighth its surface, irregularly from the figures 8 to 12 and centrally to the axle of the hands, and otherwise cracked over the surface making an explosion similar to blasting in a well, the impression made upon Mr. B. being the crushing in of the skylight overhead of the second story occupied as a photographic gallery.

Neither the glass frame nor hands of the dial, were even injured or displaced, nor did the clock stop, particles of the enamel adhered to the glass in front of the dial.

Will you, or some of your contributors, please explain the wherefores and oblige some of your subscribers in this neck of the woods. P. W. Humphreys.

Austin, Texas, March 20, 1867.

Illuminating Gas is said to be considerably increased in power by heating it and burning it with heated air. It would not be difficult or expensive to pass gas and air pipes, or a double pipe for both, in connection with household furnaces, etc., and apply combination burners.

Hot Blast.

Mr. Crossley, manager of the Ormesby Iron Works, Eng., in the course of a series of papers in the *Chemical News*, expresses the opinion that (theoretically) the saving of fuel in the furnace by heating the blast, with its corresponding result of more and better iron, will be equivalent to four times the amount consumed in heating the blast, until a temperature of blast is reached equal to the temperature of the furnace itself. Notwithstanding other things to be considered besides temperature, he thinks that we may safely aim at much higher temperatures of blast than are at present employed. He also puts forth the following theory of a desirable furnace so far as it can be rendered practicable. The fuel to be put into the hearth by a separate shaft, so closed that no current of gas can circulate through it. The hot gases rising from the point of extreme heat at the hearth, to be ignited by an upper jet of hot blast at a certain point in their passage through the ore and limestone. By an excess of air forced through the upper tweers, the iron would probably be peroxydized near the top of the shaft, and at a lower point the mixture would be melted, and still lower down the iron would be reduced by passing through the atmosphere of carbonic oxide, and in the hearth would meet with the requisite carbon and intensity of heat, and be converted into cast iron.

Mr. Crossley believes, contrary to the received opinion, that the carbonic oxide after de-oxidizing the ore passes off as carbonic acid without a second transmutation. Hence the carbonic oxide from furnace tops is waste fuel, in excess of that utilized in de-oxidizing the iron ore. Ebelman's analyses, comfirmed by observations of his own, convince him that a higher temperature must be had for reducing carbonic acid with carbon (to carbonic oxide) than is used in reducing the iron oxide with carbonic oxide, and of course than can exist further up the shaft. He is also convinced that the calcining process peroxidizes the ore, and thus hightens the temperature and economizes the work in the furnace, at the point where the oxygen of the ore unites with the carbonic oxide.

The Herring Safe Case Decided.

In our edition of January 5th, we reported in brief the leading case of Sanborn vs. Herring *et al.*

The suit involved the question of the liability of the maker and vender of burglar-proof safes, and for the facts we refer to that edition of our paper. On that trial the Jury did not agree and were discharged.

The case was brought on again and has been on trial the past week, and has presented substantially the same facts and points of law. The questions submitted to the Jury were: 1st, Was there a warranty that the safe was burglar proof? The Jury found that there was no warranty, thus deciding absolutely for Herring & Co., and therefore did not read the other points in the case.

This decision follows the English case reported by us, and settles an important principle relating not only to the safe business but extending to the sale of all merchantable goods. Probably but few if any cases have been tried in this country since the famous Gerard Will case, that has excited a more universal interest in the legal profession. The suit was conducted by Barlow and Hyatt and Judge Edmonds, for the plaintiff, and Nash, and Gerard and H. M. Needham, for defendants.

Navigation of the Colorado.

The exploring efforts of Lieut. Ives and Major Bridger at one time appeared to have demonstrated that the most of this magnificent watercourse is forever impracticable for navigation. To Bridger, the upper channel appeared to be a continuous gorge of terrific depth, the table land being inaccessible from the river, and the waters equally inaccessible to travellers perishing with thirst on the land. Fearful cataracts and rapids by their roar frightened the approaching boat expedition out of its boats to clamber for dear life up the impassable precipice and get home by land.

Later explorations by private enterprise, 1864, appear to have deprived Lieut. Ives' examination (if not the examiner) of all credit, and by parity of reasoning to render Bridger's very questionable. The part of the river which Ives declared perfectly impracticable, has been navigated in a steamer 130 feet long, at 4 feet lower water, according to the explorers, with ease and safety. One of them, Mr. Samuel Adams, who is or was lately in Washington endeavoring to induce the Government to make a complete survey and open the river and branches if possible to the interior of Utah, states that the current for over 600 miles now navigated is only about 2½ miles per hour, except the rapids, the worst of which have a fall of four feet in 120 yards, and were ascended by the steamer *Esmeralda* in seven minutes.

From the present head of navigation, some three hundred miles (to the mouth of Green river), are yet unexplored, but are believed to present no insurmountable obstacles; for the Green is navigable thence for 350 miles.

Assuming the probability that the Colorado is, or can be made, navigable to the junction, we have some 1250 miles of water highway, open at all seasons, in a very direct course from the Pacific Ocean to the interior of the trans-Mississippi region, and intersecting the Pacific Railroad. At the mouth of the river is found a safe harbor six miles in length, for ships drawing twenty feet of water. There are now eight steamers on the river, and forty seven ships and one ocean steamer have been in the harbor at the mouth within six months. The unequaled grandeur of the scenery of this river, which penetrates the rising land through an almost horizontal cut, the sides gradually increasing in hight until they rise perpendicularly a thousand feet, will probably soon render it, if successfully opened, the favorite summer trip for invalids and tourists from East and West, going or returning by the Pacific Railroad.