affinities for lime; and are evidently, also, superior to that existing between lime and water. Now, this experiment accounts perfectly for the hardening of water mortars, for their ceasing to harden when withdrawn from water, and for their again continuing to harden when replaced in water. Why they sometimes continue to harden out of water, and sometimes to retrograde, as well as why tarras and puzzolano harden better than the principal elements of which they are composed, whether those elements be combined or uncombined, will all be satisfactorily shown when we have made some necessary farther advances in our inquiries.

On Surrendering and Renewing Patents under Amended Specifications. By the Editor.

In the last volume of this Journal, p. 313, in noticing a patent obtained by Mr. C. J. Gayler, of New York, for manufacturing iron chests, we remarked that the patent originally issued to Mr. Gayler for these chests, had been vacated in the District Court of the United States for the Southern District of New York, in consequence of defects in the specification, and expressed a doubt whether, under these circumstances, the new patent could be sustained. By referring to the notice here alluded to, the reader will find a brief statement of the grounds upon which that doubt was founded. Our attention has been since called to this subject, and upon further reflection we are apprehensive that our first impressions upon this point may prove to be incorrect; we have also conversed with two gentlemen of the bar respecting it, who believe that a patent which has been declared void by a court, may, under the act of July 3d, 1832, be surrendered to the Secretary of State, and reissued under an amended specification. This act provides that whenever a patent "shall be invalid or inoperative, by reason that any of the terms or conditions prescribed in the third section of the act [of February 21st, 1793] have not, by inadvertence, accident, or mistake, and without fraudulent or deceptive intention, been complied with on the part of the said inventor, it shall be lawful for the Secretary of State, upon the surrender to him of such patent, to cause a new patent to be granted," &c.

All the patents which had been surrendered subsequently to the passing of this act, and prior to that by Mr. Gayler, were, we believe, surrendered upon a conviction existing in the mind of the patentee, that he had not complied in the first instance with the requirements of the law, and that his patent would not, therefore, be sustained if carried into court. There does not, however, appear, in the wording of the law, any thing to prevent the surrendering of a patent after it has been declared void by a jury, as this does no more than prove it to be "invalid and inoperative," and appears, therefore, to place it in the precise condition in which the relief contemplated by the act is to be afforded. Until this has been done, the patent is not absolutely "invalid and inoperative," however strong the conviction may be that such would prove to be its condition, if subjected to the ordeal of the law.

The foregoing view of the operation of the law appears to be much more consonant with justice than that first taken by us, as a patentee might, undoubtedly, surrender his patent, had his errors been discovered by himself, or by his friends, and it would be no small hardship, were the remedy denied because they had been detected by an adversary.

It may be proper to observe, that a reissued patent stands precisely upon the same basis with that originally obtained; that is to say, the surrender and reissuing do not of themselves give to it any validity, but only afford an opportunity to render it valid. The patentee may still claim more than he has invented, or the whole thing patented may be without novelty, and stand no better chance of being sustained than it did in the first instance. We could point to several reissued patents, which we believe to be in this predicament, and which must remain so, until the Ethiopian can change his skin, and the leopard his spots.

Physical Science.

Essays on Meteorology. By JAMES P. ESPY, Mem. Am. Philos. Soc., &c.

TO THE COMMITTEE ON PUBLICATIONS.

GENTLEMEN,—I send you now, for publication, the first of a series of essays on rain, hail, and snow, water-spouts, land-spouts, winds, and barometric fluctuations, in which, I hope, it will be found that I have successfully traced these phenomena to their true causes.

The announcement that these essays were about to be published, was made in a communication of mine, in the Journal of the Franklin Institute, in 1834, and they have only been withheld with a view to accumulate such a mass of facts, as would place the theory on an immovable foundation. Such a mass has now been collected, and I promise the reader, in advance, that he will find developed in the following essays, a law in meteorology, which, founded on acknowledged dynamical principles, explains at once, with a simplicity which nothing but nature can equal, all the *seven* phenomena mentioned above.

The importance of this law will readily be admitted, when it is understood that by it may be known whether there is a great storm raging at any time within four or five hundred miles of the observer, and also the direction of that storm, with the means of avoiding it, if the observer is at sea.

Yours, &c.

JAMES P. ESPY.

No. I.

Theory of Hail.

It has been shown by the experiments of Berard and Delaroché, and also by those of Clement and Desormes, that the specific heat of atmospheric air is about .250, that of water being one.

Now, if these experiments are correct, and they appear to be so, it will be easy to account for the formation of rain, snow, and hail, and several other atmospheric phenomena, which have never yet been satisfactorily explained.

The theory of these meteors may be given in a few words. When a portion of transparent vapour, in the air, is condensed into cloud, or water, the latent caloric given out expands the air containing it six times as much as it contracts by the condensation of the vapour into water.

This general principle will be most easily explained by calculating a particular case. Suppose the weight of vapour in the air to be one-sixty-fourth that of the air, which is the fact when the dew-point is about 71° Fab. Now,