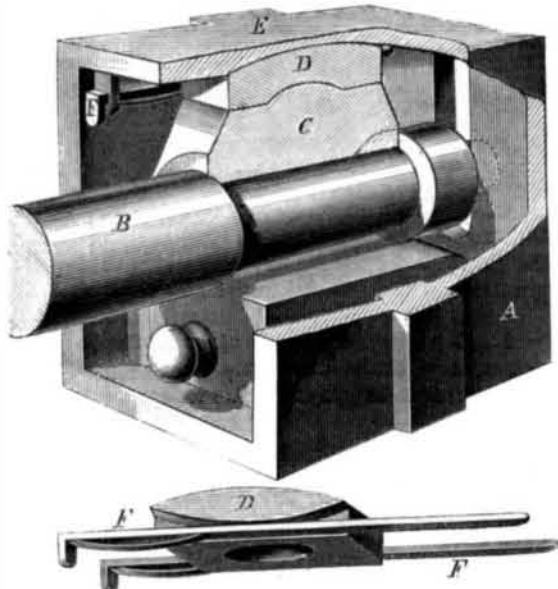


WILLIAMS' IMPROVED AXLE BOX FOR RAILWAY CARS.

The inventor of this improvement maintains that boxes, made to accommodate themselves to the varying positions of journals of railway axles and properly lubricated, would practically prevent heating when running at high speeds. He has, therefore, constructed the box illustrated in the annexed engraving, with a view to bring about this accommodation of parts.

In the engraving, A represents the housing, B the axle, and C the box.

Between the box, C, and the cap, E, is placed a plate, D. This plate has on its under side a cavity which is of the form of a portion of a sphere, into which fits a convexity of corresponding form on the top of the box. This allows the box to move with the axle in all the horizontal movements of the latter.



The plate, D, has on its upper surface a longitudinal circular convexity, fitting into a corresponding concavity in the cap, E. This arrangement permits the box to play so as to adapt itself to all inclinations of the axle from the horizontal plane.

F represents spring slides placed in rebates formed in the sides of the plate, D, which serve to hold the plate up and in place when the box, C, is taken out or put in.

There is no doubt that the use of such boxes would greatly lessen the friction of journals and their consequent liability to heat, if indeed it would not totally prevent the latter difficulty, when used in conjunction with good oil.

The improvement was patented, through the Scientific American Patent Agency, by Christopher Williams, Oct. 31, 1871, whom address, for further information, at Adrian, Mich.

A Queer Fireproof Vault.

According to the Chicago Tribune, some extraordinary revelations have been made, by the fire, with regard to the architecture of the post office and custom house building, which, proving to have been a sham and a fraud of the worst kind, has involved the loss of an immense sum of money.

The vault in the Sub-Treasury office, in which Collector McClean had deposited all the funds pertaining to his department, was built upon the second story. It rested upon two iron pillars, built from the basement, with two iron girders, of great strength and weight, connected with the wall. A third girder connected the two pillars, forming a framework. A heavy fireproof vault was built upon this foundation, and proved to be about the weakest in the city in resisting the fierceness of the fire. There were in the vault, at the time of the fire, \$1,500,000 in greenbacks, \$300,000 in national bank notes, \$225,000 in gold, and \$5,000 in silver, making a total of \$2,030,000, of which \$300,000 was in specie.

In an old iron safe, which was left outside the vault, was deposited \$35,000, consisting of mutilated bills and fractional currency. This safe was regarded with scorn and deemed unworthy a place in the vault. But, like the little fishes in the net, its insignificance saved it. When the building caught fire and blazed with fervent heat, the miserable iron pillars melted, and the immense vault, with the fabulous treasures, fell to the basement, burying the insignificant safe and its mutilated contents. The consequence was that the contents of the latter were saved, while \$1,800,000 in currency was burned to powder, and hopelessly lost.

The specie was scattered over the basement floor, and fused with the heat. There were lumps of fused eagles, valued at from \$500 to \$1,000, blackened and burned, but nevertheless good as refined gold. The employees have been compelled to rake the ruins of the whole building, and have recovered, altogether, about five sixths of the whole amount. It is probable that days will pass before they are able to find the remainder.

It is a fortunate circumstance that, only a week ago, \$500,000 in gold and \$25,000 in silver had been shipped from the city.

The building was, as before stated, a fraud of the most barefaced description, and consequently an everlasting disgrace to the country. That a vault, containing treasure to the amount actually lost, should be supported only on two iron pillars, which gave way and let it fall in ruins, and should yet make a boast of being fireproof, is a piece of irony the most acute.

But this vault was only one of the frauds. The fireproof doors of the post office vault, in which were stored the records, proved frail still. The hinges, of the massive port-

als which were to protect the Government records, were only affixed to a single brick. When, therefore, the walls expanded with the heat, the sturdy doors fell out of their own weight, each hinge carrying with it the single brick to which it held, while the remainder of the wall was as firm as possible. Of course all the records were hopelessly ruined.

This vault was fire and burglar proof. Experts are not the only persons who can judge of the value of a vault whose doors had such a feeble hold.

The building is one of a large number built on the same plan, and the condition of the lower vault suggests great weakness in those erected in other cities. It is probable that the Government will order an inspection of all existing vaults.

It is ascertained that no stone ever used in the business part of the city is worth a farthing in such a fire. Brick is the only thing that comes out whole, and is ready to try it again. The future Chicago will be a city of bricks.

AN EXPLOSION ON THE SUN.

[Communicated, by Prof. C. A. Young, to the Boston Journal of Chemistry]

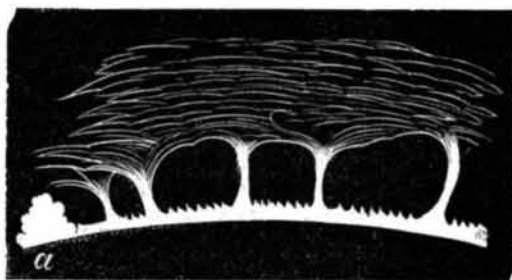
On the 7th of September, between half past twelve and two P. M., there occurred an outburst of solar energy remarkable for its suddenness and violence. Just at noon the writer had been examining with the telespectroscope* an enormous protuberance, or hydrogen cloud, on the eastern limb of the sun.

It had remained with very little change since the preceding noon—a long, low, quiet looking cloud, not very dense or brilliant, nor in any way remarkable except for its size. It was made up mostly of filaments nearly horizontal, and floated above the chromosphere†, with its lower surface at a height of some 15,000 miles; but was connected to it, as is usually the case, by three or four vertical columns brighter and more active than the rest. Lockyer compares such masses to a banyan grove. In length it measures 3' 45", and in elevation about 2' to its upper surface—that is, since at the sun's distance 1" equals 456 miles nearly, it was about 100,000 miles long by 54,000 high.

At 12:30, when I was called away for a few minutes, there was no indication of what was about to happen, except that one of the connecting stems at the southern extremity of the cloud had grown considerably brighter, and was curiously bent to one side; and, near the base of another at the northern end, a little brilliant lump had developed itself, shaped much like a summer thunder head.

Fig. 1 represents the prominence at this time, a being the little thunder head.

FIG. 1.



What was my surprise, then, on returning in less than half an hour (at 12:55), to find that in the meantime the whole thing had been literally blown to shreds by some inconceivable up-rush from beneath. In place of the quiet cloud I had left, the air, if I may use the expression, was filled with flying debris—a mass of detached vertical fusiform filaments, each from 16" to 30" long by 2" or 3" wide, brighter and closer together where the pillars had formerly stood, and rapidly ascending.

When I first looked, some of them had already reached a height of nearly 4' (100,000 miles), and while I watched them they rose, with a motion almost perceptible to the eye, until in ten minutes (1:05) the uppermost were more than 200,000 miles above the solar surface. This was ascertained by careful measurement; the mean of three closely accordant determinations gave 7' 49" as the extreme altitude attained, and

FIG. 2.



As the filaments rose they gradually faded away like a dissolving cloud,

* This is the name given by Schellen to the combination of astronomical telescope and spectroscope.
 † The chromosphere (called also *strata* by Proctor and others) is the layer of hydrogen and other gases which surrounds the sun to a depth of about 7,000 miles. Of this the prominences are mere extensions.
 ‡ The sketches do not pretend to accuracy of detail, except the 4th; the three rolls in that are nearly exact.

and at 1:15 only a few filmy wisps, with some brighter low streamers down near the chromosphere, remained to mark the place.

But in the meanwhile the little thunder head, before alluded to, had grown and developed wonderfully into a mass of rolling and ever changing flame, to speak according to appearances. First it was crowded down, as it were, along the solar surface; later it rose, almost pyramidally, 50,000 miles in height; then its summit was drawn out into long filaments and threads, which were most curiously rolled backwards and downwards, like the volutes of an Ionic capital; and finally it faded away, and by 2:30 had vanished like the other. Figs. 3 and 4 show it in its full development; the former having been sketched at 1:40, and the latter at 1:55.

FIG. 3.

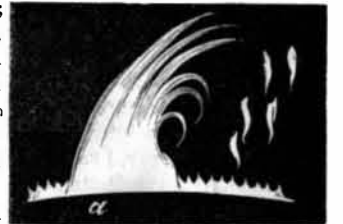


FIG. 4.



The whole phenomenon suggested most forcibly the idea of an explosion under the great prominence, acting mainly upwards, but also in all directions outwards, and then after an interval followed by a corresponding in-rush; and it seems far from impossible that

the mysterious coronal streamers, if they turn out to be truly solar, as now seems likely, may find their origin and explanation in such events.

The same afternoon, a portion of the chromosphere on the opposite (western) limb of the sun was, for several hours, in a state of unusual brilliance and excitement, and showed in the spectrum more than 120 bright lines, whose position was determined and catalogued—all that I had ever seen before, and some 15 or 20 besides.

Whether the fine *aurora borealis* which succeeded in the evening was really the earth's response to this magnificent outburst of the sun, is perhaps uncertain, but the coincidence is at least suggestive, and may easily become something more, if, as I somewhat confidently expect to learn, the Greenwich magnetic record indicates a disturbance precisely simultaneous with the solar explosion.

Are Men to Fly?

Darwin tells us that even in the upper regions of the air, near the summits of the Andes, vultures may be seen floating onwards for miles upon motionless wings. What is the secret of this flotation? Gravitation acts as forcibly on the substance of the bird as on that of the animal. Nor can we believe that there is any buoyancy, properly so called, in the bird's body or wings.

Those vultures, which seemed to float steadily through still air, must have received support from the air in one or more of three several ways. Either by swift motion, acquired before the floating began and slowly reduced through the effects of aerial resistance, or by the action of aerial currents through which they were carried, or else, while seeming to float horizontally, they were in reality traversing a slightly sloped descending path. Neither of the two former explanations seems available, because the floating motion is continued so long that the frictional resistance of the air would almost certainly have destroyed a large share of the original motion through the air. This would equally happen whether the bird had in the first place urged its way swiftly through the air, or had floated itself off, so to speak, upon a swiftly moving air current. On the other hand, there would seem to be no valid objection against the third explanation; for a single observer, at rest, would have no means of determining whether a bird were sailing along horizontally, or gliding down a gentle incline. But it matters little which explanation of the three we accept as the most plausible. The point to be chiefly noticed is the fact that, a heavy body—for the vulture is no chicken, so to speak—can be sustained, for long distances, merely by the supporting action of the air.

There can be little doubt that it is only on account of the perfect steadiness of their motion through the air that they are thus supported. The efforts of aeronautical mechanics must be directed to secure a similar steadiness of motion for aerial facilities. Granted this, there can be no reason why the powers of steam and iron should not avail to secure an aerial motion even surpassing in rapidity the flight of the swiftest birds. Unless we are willing to believe that birds fly by some power distinct from any which physical science deals with, we seem justified in believing that the bird may be matched, or surpassed, by the flying machine, as surely as the swiftest animals are surpassed by the locomotive. It is encouraging to consider that the actual amount of power necessary to convey a weight through the air (if that support is derived directly from the air), is very much less than that required to convey the same weight by sea or land. In the presence of failing coal supplies, this consideration will one day assume first-rate importance.—Spectator.

Baron Ferdinand de Lesseps, to whose perseverance and talent the world is indebted for the Suez Canal, has recently presented to Lafayette College, Pennsylvania, a set of twenty-three volumes of reports and documents relating to the conception and execution of the remarkable enterprise. The history of the work is complete to the smallest details, and is illustrated by beautifully executed maps and plans. This courteous attention will be appreciated by all our readers.