

SCIENCE.

FRIDAY, DECEMBER 14, 1883.

THE SIGNAL-SERVICE AND STANDARD TIME.

It has been announced that the chief signal-officer has ordered his corps of observers to continue to be governed by the local time of their respective stations. It is difficult to understand this action on the part of Gen. Hazen. It would seem, that, next to the transportation companies, the weather bureau would be most benefited by the adoption of a system of time which would render all observations strictly and easily comparable with each other. The position taken by the service is all the more remarkable, when it is remembered that only two or three years ago its chief was himself a warm advocate of the new scheme, and declared his anxiety to further its introduction in every way in his power. It will be everywhere admitted that the adoption of standard time by all observers would greatly aid in securing its acceptance by the people generally; and it is to be hoped that it will be shortly done, unless some grave reason, which is certainly not apparent, exists for its rejection.

A SUGGESTION TO AUTHORS.

AUTHORS who republish in a separate form papers originally printed in society transactions or journals should be careful to preserve the original pagination of the serial from which they are extracted, or to indicate the same in some clear way for purposes of ready and correct reference. It would really be worth calling a convention of our scientific societies for the purpose, if a reform could be effected in this matter. Time is too precious to be wasted in search, often fruitless, for an original source, when it could have been indicated, without additional cost, upon the separated copies. It would also be far better if the original page itself could be left intact without overrunning:

otherwise errors of reference will be entailed on posterity, which will prove justly exasperating to the student obliged to consult the vast literature of that coming day. The reform cannot come too soon nor be too thorough.

EXPERIMENTS IN BINARY ARITHMETIC.

THOSE who can perform in that most necessary of all mathematical operations, simple addition, any great number of successive examples, or any single extensive example, without consciousness of a severe mental strain followed by corresponding mental fatigue, are exceptions to a general rule. These troubles are due to the quantity and complexity of the matter with which the mind has to be occupied at the same time that the figures are recognized. The sums of pairs of numbers from zero up to nine form fifty-five distinct propositions that must be borne in memory, and the 'carrying' is a further complication. The strain and consequent weariness are not only felt, but seen, in the mistakes in addition that they cause. They are, in great part, the tax exacted of us by our decimal system of arithmetic. Were only quantities of the same value, in any one column, to be added, our memory would be burdened with nothing more than the succession of numbers in simple counting, or that of multiples of two, three, or four, if the counting is by groups.

It is easy to prove that the most economical way of reducing addition to counting similar quantities is by the binary arithmetic of Leibnitz, which appears in an altered dress, with most of the zero-signs suppressed, in the example below. Opposite each number in the usual figures is here set the same according to a scheme in which the signs of powers of two repeat themselves in periods of four: a very small circle, like a degree-mark, being used to express any fourth power in the series; a long loop, like a narrow 0, any square not a fourth power; a curve upward and to the right, like a phonographic *l*, any double fourth power; and a curve to the right and downward, like a phonographic *r*, any half of a fourth power; with a vertical bar to denote the absence of three successive powers not fourth powers. Thus the equivalent for one million, shown in the