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A YEAR'S PROGRESS.

During the twelve months now drawing to a close there have quietly happened not a few events which in times of slower progress, when great projects and great achievements were less a matter of daily occurrence, could scarcely have failed to make a grand stir in the world. There can be indeed no stronger proof of the exceptional character of the present time than our proneness to accept such things as matters of course. It is only when era-making events become common that they cease to be remarkable.

The regular readers of the SCIENTIFIC AMERICAN do not need to be told at this late day what important, if not memorable, occurrences in the world of progress—commercial, industrial, and scientific—have characterized the past year. Having followed from week to week this record of the world's most effective thought and action, they are already possessed of the grand results of the year's activities. It may not be unprofitable, however, before closing the history of the year, to recall to mind some of the more significant of its events, some of the more notable movements of progress it has developed.

It is safe to assume that the progress which has added most to our individual enjoyment, as well as to our national well-being, has been connected with the wonderful improvement in industrial and commercial affairs which the year has shown. The country was never more generally and earnestly at work than to-day, and was never working to better advantage. And, although in certain quarters an over-eager speculative spirit forbodes disaster to many, there is every reason to hope that the solid industries of the land will not be seriously infected, or seriously injured by the natural and inevitable consequences of speculative "booms."

Of purely scientific events it is hard to say which of the many important ones stand out most prominently; and the work of discriminating is made all the harder by the circumstance that the achievements first made known this year have largely been, as usual, the final outcomes of long series of patient labors; while the larger part of the year's work of our scientific men, in the field and in the laboratory, remains unreported.

Three or four new metals have been discovered; but that sort of thing has ceased to excite general interest. While one class of chemists has been thus adding to the list of elements, another class has been working with no slight promise of success to show that several if not all of the elements are but variant forms of one matter stuff. Meantime Mr. Crookes has been carrying forward his researches in connection with the ultra-gaseous state of matter, though apparently without making any discoveries of a radical character. Mr. Edison has made some valuable observations with regard to the behavior of highly heated metals in vacuo, and has materially improved the means of converting power into electricity. His electro-chemical telephone has been rapidly developed and practically applied; the sonometer has grown out of his induction balance, and the micro-telephone has been the basis of not a few more or less useful instruments of physical or physiological investigation. Mr. Edison's call for platinum for his long promised electric lamp has resulted in the discovery of many deposits of the metal in the West and elsewhere. A late dispatch from Colorado reports the discovery of the rare metal uranium in the Sacramento mining district. The ore is said to run 60 per cent; but the probable quantity of ore in the deposit is not mentioned. The development of the mines of gold and silver in the West during the year has been very rapid; and close at home we have the discovery in Westchester county, New York, of what promises to be of greater utility than any mine of gold or silver, namely, vast deposits of excellent emery. Another matter of local interest has been the addition made by the State surveyors to the accurate knowledge of the geography and topography of the central parts of New York. The work of geological and geographical exploration in the West has been pushed forward not a little during the past season; and the Canadian geological survey has done much good work. Further north the expedition in search of the remains of Sir John Franklin have made valuable corrections in the map of the region north of Hudson's Bay. On the opposite side of the continent the Jeannette has made a bold and promising push into the unexplored regions within the Arctic circle north of Behring's Strait. The safe passage of Nordenskjöld through the Siberian seas is the most notable event in northern exploration. Prejvalski and other Russian explorers have been doing good work in high Asia. Major Pinto has crossed the African continent; and a large number of exploring parties have pushed in various directions into the little known interior. The last report of importance mentions the discovery of the head springs of the Niger by a couple of Frenchmen.

In Australia, Forrest has made a bold and successful passage across regions hitherto unexplored, discovering vast tracts of farming and grazing lands where all was supposed to be desert.

In the field of engineering, a large number of important undertakings have been brought to successful issue, particularly in the construction of long and lofty railway bridges and great tunnels. Among the latter is the famous Sutro tunnel, and we are almost able to add the St. Gothard, which is rapidly approaching completion. The great work of improvement in the harbor of Genoa has been largely advanced; considerable good work has been done in the Hell Gate channel of New York harbor, and on the pro-

posed tunnel under the Hudson. Several extensive ocean piers have been constructed at Long Branch and Coney Island. The mouth of the Mississippi has seen the practical completion of the opening of its channel to deep-draught shipping. A new Atlantic cable has been laid, and other works of the same character have been carried out in the Indian Ocean and elsewhere.

These are but a few of the topics of more than temporary interest which the readers of the SCIENTIFIC AMERICAN will recall. To speak of the important projects proposed, discussed, or actually begun during the year—like the proposed ship railway across the Isthmus of Panama, for example—would swell this article, already too long, beyond all reasonable limits. Besides, our readers do not need to be specially reminded of them. Enough appears at the hastiest glance to show that progressive men have not been asleep during the year, and that those who have cared to read about the world's real work have not lacked material for engaging their attention. This, not to speak of the hundreds of inventions described and figured in our pages; the numerous illustrated papers on our great industries; the illustrated papers on practical mechanics, and the many suggestions for inventive work that have been furnished from time to time.

STRENGTH, WEIGHT, AND FINENESS OF WOVEN FABRICS.

The last few years of particularly close competition in finding a market for all kinds of manufactured goods has rendered necessary very close attention to many little details which has before escaped notice, or were considered too trivial to be taken into account. It has been found, however, that these small items have often made the difference between a paying and a losing business, and, as is almost always the case, the closer study given to the practical working up of stock, in order to make these savings, has made possible a higher standard of excellence, and secured greater regularity and evenness in the production.

In the making of plain cotton cloths, as at present conducted in this country, we find an illustration of probably as great improvement in this direction as can be pointed out in almost any of our industries. It is but a few years since when all the yarn worked up was largely put in the goods by guess as to its weight and strength, or with very insufficient tests as to either point, and, although a certain number of threads to the inch was generally designed, this was not always obtained, while the weight of the fabric was largely only a question of average. To do business after this fashion now would be simply ruinous, even supposing that goods so made would meet the demands of buyers, who have been thoroughly educated on these points during the steadily falling values of all manufactured goods from 1873 to 1879. Now the yarn, almost from the time it ceases to be "roping," is tested as to its weight and strength, and, before it is ready to go to the loom, a very close standard must be obtained. This is secured by frequent trials for strength in a tester so nicely adjusted and so delicately balanced that it will determine the strain under which a thread will break even to the thousandth part of an ounce, and by scales which will show the slightest variations. The different qualities of cotton, of course, give varying results as to strength, but the fineness of the thread, the number of threads to the inch, and the weight of cotton to the yard (as also the amount of sizing or starch, which all our manufacturers use, though to a less extent than is done in England), must run exactly according to the specified quality and description of goods to be made. It is common enough for buyers to have little magnifying glasses, with the aid of which they can count the number of threads to the inch, but it is not so easy for them, after the goods are made, to determine the strength of the thread to a nicety, or tell how much of the weight has been added in sizing—at least, these are points about which very few of them trouble themselves much. The very low figures at which all kinds of cotton goods have sold for the past three or four years have caused the production of a much larger proportion of cheap goods than usual. Manufacturers have sought in every way to make something which would sell for a small price. Their efforts in this direction have given them a better gauge of the different points of superior or inferior goods than most of those who handle their products have yet attained. It is true, we have heard frequently how much better our goods are than some of those made in England, and how much more starch and sizing English manufacturers put in the finished cottons they export, and, as to a considerable proportion of the goods we make, we have no reason to doubt their superiority. It is equally true, however, that our manufacturers have nothing to learn from those in England in the way of cheapening their goods, and in making a poor article look like something a good deal better than it is. While we keep from sending such goods abroad we shall probably retain, and may even improve upon, the reputation we have already obtained, but our foreign competitors will be so exceedingly watchful that any progress we make will only be a success well earned. In the goods made for home consumption, however, it will be well for buyers not to take too trustfully anything offered them, on the broad ground that American cotton goods, because they are made here, are necessarily honest and well made. This used to be the rule a few years ago, but our manufacturers have now learned so well how to cheapen their goods that all those wishing to place low priced fabrics on the market, and such too as will look as well as those of higher cost—are thoroughly informed as to the manner of doing it.