may proceed to develop it into a practical machine ready for the market. It is this early alliance of the law with the inventor which has made possible the splendid developments of invention and discovery which have marked the present century, and to sever this alliance by any such means as suggested above would be to discourage the inventive habit among the people, and place its rewards apparently out of reach.

But over and above the objections to this scheme of examination and certification of results on general principles, it would involve such vast operations as to be quite impracticable. The United States Patent Office has granted in a single year as many as 26,292 patents, and the powers of the large staff of examiners are necessarily taxed to the utmost in determining the question of novelty in such a vast number of cases. But if, in addition to the novelty, the Patent Office or any other board had to determine by test the practical utility of each invention, it can easily be seen that the cost and time required for such a work would render it altogether impracticable.

THE GEOLOGICAL SOCIETY OF AMERICA.

The ninth annual meeting of the Geological Society of America was held in one of the lecture halls of the United States National Museum in Washington, D. C., from Tuesday to Thursday, Dec. 29 to 31, 1896, inclusive. It was noted as being the largest and best winter meeting the society has ever held. Washington has become a center of attraction for all classes of scientists and especially so for geologists, since the establishment of the headquarters of the national geological survey here necessitates the residence of a numerous body of geologists in the city during the winter.

The society was welcomed by Dr. Charles D. Walcott, the director of the United States Geological Survey, who suggested the idea of having Washington as the permanent place of meeting, especially for the annual winter meeting. Prof. Joseph Le Conte, president of the society, also fervently approved of the suggestion, but no action was taken.

Since the report of a year ago the society has lost three names from its list by death. These members were Prof. Robert Hay, of the Kansas State and afterward of the United States Geological Survey, Charles Wachsmuth, the noted student of fossil crinoids, and N. J. Giroux. Appropriate memorials of these men were read at the first session of the meeting. Seven new members were elected to the society, making a total of 240 fellows. This makes a net gain of ten in membership during the past year, which is very satisfactory, considering the continued financial depression. The chief feature of the meeting may be considered to be the presidential address. This was delivered by Prof. Joseph Le Conte, professor of geology in the University of California, whose name is well known throughout the country on account of his masterly text books on the science. His subject was, "The different kinds of earth crust movements and their causes," and he said in part:

Well nigh the whole drama of the forces at work on the earth is actuated by the sun, and all the phenomena of natural, physical, mental and social life arise from the same source. Igneous geological forces are the exception to this rule. There are, therefore, two groups of forces at work shaping the earth, the external or sun derived and the internal or earth derived. As an example of the former may be cited the agents of subaerial erosion, and of the latter, volcanic activity. The forces coming from the sun tend to reduce the inequalities of the earth's surface, whereas the others tend to increase the inequalities and accentuate the differences of level. The first set wears down, the second builds up.

As in biological science nearly the whole advance to the present time has been made by studying external phenomena, and the next advance must be made by intimate study of internal phenomena, so in geology much has been done by studying the forms produced by erosion and other external activities, but now attention is mainly devoted to the attempt to learn about the interior of the earth. Volcanoes and earthquakes are manifestations of grand internal crustal movements.

Internal or earth derived movements of the crust may readily be separated into four groups:

1. Primitive movements, by which oceans and continents have become differentiated.

2. Those by which mountain ranges have been made.

3. Oscillatory movements, or those which are not continuous in one direction.

4. Movements which have been determined by the transfer of load from one part of the earth's surface to another. This last group may not properly belong here, because the transfer is due to the sun. The loads referred to may be of ice or of sediment, and their transfer results in the vertical movement of great crustal blocks.

The forces of the first two groups are primary, continuous and cumulative, while those of the other groups are secondary and oscillatory and tend to hide or obscure what has been done by the first two.

Assuming that the earth was once an incandescent, fused spheroid of much greater size than now, had the material of which it was composed been homogeneous, the surface formed on solidification would have been even. Variations in density produced inequalities in the surface, the denser portions sinking. This factor alone would not have produced great depressions, but the denser areas would be more conductive of heat than the lighter, which would act with the other to produce the beginnings of the oceanic depressions and the continental elevations. The primeval ocean may have been universal and the continued contraction of the crust would deepen the beds and separate the bodies of water by means of continents. The permanency of the relative positions of ocean basins and continental areas was first promulgated by the late Prof. J. D. Dana and the doctrine is now generally accepted. The mean depth of the ocean is two and one-half miles and the mean elevation of the land is one-third of a mile, so that the average inequality of the earth's surface is less than three miles. This is about $\frac{1}{1300}$ of the earth's radius and would be represented by a difference of $\frac{1}{6}$ inch on a globe two feet in diameter.

The portions of the fused globe which were to become land areas would be the first to crust over on solidifying, because non-conductivity would prevent transference of heat from the interior to the surface, and the bottoms of the ocean depressions, having higher conductivity, would retain a high temperature longer and would be the last to crust over. The suboceanic earth material to the center of the earth is denser than the subcontinental material in the ratio of the subcontinental area to that of the suboceanic area.

The second group of earth derived forces are those producing mountain ranges, and are manifested as lateral thrusts. The features of the earth's surface thus produced are permanent in their character. Objection has been made to the theory of lateral thrust on account of the alleged shallow depth of the level of no strain. The earth increases in temperature as we go down, conductivity also increases, and density grows higher as we approach the center of the earth. Initial temperature probably increased with depth. All these factors lower the level of no strain and result in practically eliminating it from the problem. The lateral thrusts then resulting from contraction due to cooling are potent factors in the formation of mountain ranges.

The third group of forces produce vertical oscillatory crustal movements, and their effects are shown by numerous unconformities in strata. An example of this group is the Colorado plateau. This was sea bottom from the carboniferous to the end of cretaceous time, receiving from 12,000 to 15,000 feet of sediments. At the end of the cretaceous this mass began to rise and is still rising, although it has already been elevated more than 20,000 feet. But unconformities beneath the carboniferous strata show that the region went through several great oscillations before that time. More recent and widespread were the oscillations which took place during and after the glacial period. These amounted to thousands of feet and affected large areas. These are examples of the commonest of the movements of the earth's crust, but the question of their cause is the most inexplicable problem in geology, and no glimmer of light has yet been thrown upon it.

The fourth group of movements are those caused by gravitative readjustments of the crust. This is the doctrine of isostasy as enunciated by Major C. E. Dutton and others. A continuous transfer of material from one place to another must eventually be attended by subsidence where great deposits are forming and by elevation where erosion is taking place, but we must not conclude from this that all subsidence is caused by sedimentation and all elevation by removal of material by erosion. Isostasy does not explain the formation of mountain ranges like the Appalachians, the Wahsatch, the Sierra Nevada, etc. Mountain ranges are not now as formerly supposed to have been made by one set of forces; they are thought to be the result of a combination of forces, and monoclinal uplifts join with others in their formation.

Prof. Le Conte's address was listened to by a large and appreciative audience, which nearly filled the lecture room of the Columbian University. The officers of the society for the ensuing year are: President, Prof. Edward Orton, of Columbus, Ohio; vice-presidents, Profs. J. J. Stevenson, of New York City, and B. K. Emerson, of Amherst, Mass.; secretary, Prof. H. L. Fairchild, of Rochester; treasurer, Dr. I. C. White, of Morgantown, W. Va.; editor, J. Stanley-Brown, of Washington, D. C. The newly elected fellows of the society are: R. M. Bagg, E. H. Barbour, S. W. Beyer, A. P. Coleman, H. S. Gane, J. B. Porter, A. C. Spencer.

More than fifty papers, covering a very wide range of subjects, were presented at the meeting.

A NEW STEAMSHIP LINE.—The Belgian Steamship Company has made an arrangement with the Canadian government for the establishment of a fortnightly service of steamers between Antwerp and Canada.—Uhland's Wochenschrift.

The Overproduction of Books.

The enormous output of books in late years surprises everyone; few facts are more familiar, few are more commonly remarked, and few arouse such confusion of mind as to where they came from, why they exist, and how they find buyers and readers. In the year 1895 no fewer than 5,580 new books were published in England, besides 935 new editions of old books. In a single month the New York Times, to which we are indebted for these facts, has received more than 400 books for review.

The output is indeed so large that one might be tempted to infer that the proportion of books published to manuscripts offered for publication is becoming every year much larger than it formerly was. But the fact appears to be that this proportion, instead of changing in that way, is changing in the other direction. With all the increase in publications, there has also been increase in writing. Frederick Macmillan, at a recent dinner in London, stated that his house in one year had accepted only 22 books out of 315 that were submitted; while Mr. A. Chatto, in a published interview, affirmed that his house accepted an average of only about 13 for every 500 submitted.

Surrounded as we have been by a flood, we have, therefore, to thank the publishers that we are not in the midst of a deluge. Assuming that Mr. Macmillan's ratio is the ratio of all publishers, and provided all submitted manuscripts had been published, but excluding the unknown factor that the same manuscript was often submitted to several publishers, we should have had instead of 5,580 new books, 72,540; while the same computation, with Mr. Chatto's figures as a guide, would have given us 212,040 books, or nearly 700 for each day of the year, exclusive of Sundays!

The causes of this increase in the number of books are not far to seek. Cheapness of production—cheaper composition, cheaper paper, cheaper binding—is a great one, but a greater is the increase in the number of those who read. Popular education here shows some of the results of its work. But who shall say why 313 persons should continue to write books when only 22 can have them accepted, or why 500 should write them when only 13 can hope for acceptance? Is this also due to the spread of popular education and the resultant ambition to write?

The ability to write has become a common accomplishment; that is, the ability to write what is fairly grammatical. Scores of persons who write books which they hope to see published probably do not realize that something more than correct sentences is necessary. Provided they have a subject, with some knowledge of it, all that remains necessary from their standpoint is to write correctly. They do not know that correct writing no more makes a good writer than correct use of mechanics' tools makes an architect. No mere grammarian ever was an artist in words; indeed, the greatest artists in words have sometimes not been grammarians at all.

The future probably holds for us little hope that the number of books will decline; on the contrary, they are more likely to increase in number with the years. But we need not despair; despair remains only for the librarians—for Mr. Spofford and Dr. Billings. The great public will be protected, for the good books will live, and the bad ones will surely die—and the death will be a natural one. There were millions of houses in the ancient world, but only one Parthenon. Italy has had millions of buildings, but the Pantheon, St. Mark's, and St. Peter's still stand, as they will stand for some ages longer. We may get our 5,000 or our 10,000 books each year, but it will still remain true that not more than one really great book can be produced in a century or so. Europe waited several centuries to get her Dante, her Shakespeare, her Moliere, her Cervantes. Meanwhile, with the second great ones came whole regiments of lesser men, who had their brief reward, and then went each his silent way, book in hand, into the unknown beyond.

What a Pennyworth of Gas Can Do.

In a lecture recently delivered at the Royal Victoria Hall, London, says the Practical Engineer, Prof. Carlton J. Lambert stated that 37 cubic feet of gas, which is valued at one penny (two cents), and weighs about 1¼ pounds, can generate about 1 pound of water when burned, and about 19 cubic feet of carbonic acid. It can heat 30 gallons of water from 50° to 110° for a bath, or it can boil 8 gallons of water in good kettles, and make tea for 64 persons. It can work a 1 horse power gas engine for one hour, or lift a weight of 88 tons 10 feet high, doing the work of six men for one hour. It can melt 10 pounds of iron, and make a casting in 20 minutes, which ordinarily would require two hours and 30 pounds of coke. It can braze a metal joint in two minutes, which would require 20 minutes in a forge. If burned in a 6 inch flue for ventilation purposes, it can induce 80,000 cubic feet of pure air. It can give you a brilliant light (Welsbach incandescent) of 50 candle power for nine hours. It can, in a good radiating stove, comfortably warm a room 16 feet square for an hour. It can easily cook a dinner for eight persons.