him. With the aid of the present work, which—for a small yearly sum, no more than sufficient to cover the actual cost—may be added to every one's library, the most accurate information may be obtained, not only regarding the latest improvements and discoveries, but also all that has hitherto been accomplished in any special branch of industry or mechanism. So that within a few years the accumulated volumes will form the most elaborate encyclopædia of the useful arts ever published.

Each monthly edition will contain at the least estimate one thousand patents, while the aggregate of the latter, published in the twelve volumes, will reach nearly fourteen thousand per annum. If we compare the above large total with that corresponding in other countries, we find that the sum of all the patents granted in the United States in a single year exceeds the entire number issued by many nations during the past century or since the establishment of their patent offices. This fact alone shows that the work will be of still wider value as furnishing, not only to Americans but to the world, a complete record of the majority of all the useful inventions produced.

Great Britain approaches us most nearly in the number of novel ideas yearly devised by its inhabitants and placed under the protection of its patent laws. The statistics of this nation show that 3,000 patents are annually granted, but little over one fifth of the average taken out in the United States. The English specifications and drawings have, however, been regularly published for a considerable period back, so that we are enabled to draw the contrast between the British and American modes of transmitting this valuable information to the public.

The specifications of the English patents are issued in volumes measuring 7½x10x2½ inches, each weighing some 4½ pounds. Each year's publication occupies about fifty books of specifications alone, the drawings being bound separately in fifty additional volumes—16x22x3 inches in dimensions, and weighing about fifteen pounds each. The aggregate dead weight of a year's issue reaches 975 pounds or *nearly half a tun* of printed matter, all of which, it seems, is required for the description of 3,000 patents in a manner not a whit clearer or fuller than our compact yet elaborate volumes. On the above English plan of publication, it would require about five hundred volumes a year, weighing in the aggregate over two hundred tuns, to produce the same number of patents as are yearly issued by this country, and which Commissioner Leggett expects to print in thirteen comparatively small volumes. As to the comparative expense of the two systems, no comment is necessary. As a matter of course the English publications might as well remain unprinted, for they are virtually out of almost every one's reach.

We can confidently predict a world-wide circulation for our new work. It will prove a trusty guide to the inventor and a useful and convenient means of reference for the Patent Office Examiners, as well as a valuable repository of knowledge for all interested in or desirous of obtaining information regarding our industrial progress. As an addition to our mechanical and scientific literature, it enures greatly to the credit of Commissioner Leggett, to whom its inception is due, while, as a monument of the national inventive genius, it is a production of which the country may justly be proud.

IMPROVED SHIP'S COMPASS.

The Earl of Caithness, at present visiting New York city, has recently exhibited to us a new form of gravitating ship's compass, invented by himself. Seamen are well aware that during heavy weather the rolling and pitching of a vessel cause the compass to oscillate, and that the consequent side movement of the points often renders proper steering a matter of difficulty, and at times results in throwing the ship far off her course. Lord Caithness' invention overcomes this difficulty by abolishing the gimballs in which the compass box is supported in the binnacle, and substituting therefor a ball and socket joint.

The arrangement of this device is simply a ball of metal fastened directly under and to the center of the bottom of the compass box, resting on a ring formed in the top of a hollow conical support, which is firmly attached to the binnacle. Just within the ring is a small metal point, and in the ball is a slot, fitting over it, so that sidewise rotary motion of the parts is prevented, and the compass, when adjusted to the ship, is held in proper position.

Attached to the ball, and counterbalancing the box and its contents, is a vertical rod, on which slides a weight. Within the binnacle, this pendulum has free play, and, by its gravity remaining always vertical, will necessarily retain the instrument in a horizontal position, no matter how deeply the ship may roll or pitch.

The variety of compass employed, whether liquid or ordinary card, is of course immaterial. In port, when it is desired to hold the compass steady, it is only necessary to slip the weight on the vibratory rod an inch or so down, so as to embrace the end and also the top of a small fixed upright at the bottom of the binnacle, securing it in place by a set screw.

His Lordship's invention is one of practical utility, and is both inexpensive and a decided simplification and improvement on devices now in use. We have before us many testimonials received from the British Admiralty, and officers of the navy and merchant service, giving records of its performances, all of which unite in its commendation. We note that in one instance a compass remained free from oscillation when the vessel was rolling to an angle of 30° and at times 35°. As Lord Caithness is desirous of introducing his device in the United States, we take pleasure in thus presenting an invention, evidently meritorious, efficient, and well worthy the careful attention of all seamen.

THE NOVEMBER ATMOSPHERIC WAVE.

Recent reports from the Signal Service Bureau indicated the discovery that the great meteorological phenomenon, known in Western Europe and the British Isles as the November atmospheric wave, has appeared on this continent. That this aerial billow has been hitherto believed to exist only within circumscribed limits, is shown by the following, written by Sir John Herschel in 1863, in which he speaks of "that great periodical phenomenon whose recurrence is beginning to be recognized as one of the features of our European weather table—a vast and considerably well defined disturbance, peculiar, it would seem, to this portion of the globe." The views of the distinguished astronomer are, however, now clearly shown to be erroneous. On November 12 last, says the report, a similar atmospheric wave began to break over the shores of Oregon and British Columbia, as shown by the weather telegrams. By the evening of the 13th, it had spread over nearly all the Pacific States and Territories, Utah and Nevada, and at midnight was pouring through the passes of the Rocky Mountains. On Thursday, the 14th, it descended upon Colorado, Nebraska, Kansas, and the Indian Territory. On Friday morning, it extended in unbroken magnitude and magnificence from Oregon and Washington Territory eastward through the great trough or depression of the Rocky Mountain back bone in Idaho and Montana, and stretched thence to the Lower Missouri and Lower Mississippi Valleys and over the western shores of the Mexican Gulf. Through this discovery the approach of winter may be accurately predicted, as it advances from the Pacific coast eastward in the great current of westerly winds. By showing that the warm air from the Pacific Ocean laden with vapor breaks over the icy summits of the Rocky Mountains, it explains the cause of the vast falls of snow which so effectually blocked the Central and Union Pacific Railroads last year. The air robbed of its vapor, and besides deflected upwards, is, it is believed, further chilled, and large quantities of latent heat are liberated. The warmer strata being then borne eastward explains the existence of the mild winter belt lying northeast of the mountains of Idaho and Montana and extending to the Athabasca and Saskatchewan rivers.

Whether or not this vast motion in the atmosphere has any connection beyond that of coincidence of time with the November meteoric belt, through which we have recently passed, is an open question. It undoubtedly has had some influence in the severe storms recently experienced. The telegraph informs us that, on the night of the 12th of November, the polar bands of cloud, said by Humboldt to presage tempests, appeared; while on the same evening a prediction of the Signal Bureau was verified by the rising of a heavy storm which visited the lakes with great severity and swept over the whole face of the country. The more immediate effects of the present wave are said to be drier and more wintry weather.

The Signal Bureau deserves the greatest credit for the valuable addition to scientific information elicited by its researches, and we trust that the Government will appropriate ample funds to promote the prosecution of such important labors.

DEATH OF HORACE GREELEY.

This distinguished editor, so widely known in connection with the New York *Tribune*, died on November 30, at the age of 61 years, at Chappaqua, N. Y. His demise has deprived the world of industry, progress, and science, of one of its stanchest and most zealous friends. The son of a New Hampshire farmer, he was apprenticed to a newspaper printer in Vermont, and came to New York in 1831, with very little money, and no friends. He obtained work as an ordinary type setter in a printing office, and soon showed his intelligence and ability. In partnership with a friend, he undertook the printing of a one cent daily paper, which soon failed; and Mr. Greeley then found another partner, with whom he started the *New Yorker*, a journal which had for seven years and a half a high reputation for its literary and critical ability. Mr. Greeley was subsequently the editor of *The Jeffersonian*, and then of the *Log Cabin;* but his great work was the establishment of the New York *Tribune*, the first number of which was issued in April, 1841. In this work he was ably assisted by Thomas McElrath, his partner, without whose business abilities it is not likely that the *Tribune* would ever have attained its present success.

Although Mr. Greeley's talents were chiefly literary and controversial, he had a most enlightened sympathy for all the branches of science and the progressive spirit of the age in which he lived. He was notably the friend of the industrious, the ingenious, and the intelligent among the people; and his journal owes much of its popularity to this trait in the character of its principal editor. His influence as a journalist has been acknowledged by all parties, and although much of his life had been passed in weathering political storms, he has left few personal enemies behind him. He was the recent candidate for the Presidency, of the Democratic party, and to over exertions made during the late campaign is due, it is believed, the illness which has so fatally resulted Horace Greeley was a remarkable man, and his name will occupy an eminent place in the annals of American history.

J. E. T. has tried a recipe published in our paper for a cement composed of glue and rubber in spirits of niter, and says the thing wont work. The rubber dissolves but the glue remains solid. In dissolving and combining many substances, it is oftentimes necessary to observe a certain order. In the present case, if our correspondent will dissolve the glue in a little water and then add it to the solution of rubber in spirits of niter, we think he will succeed.

[Reported for the Scientific American.]

ELECTRICITY AT THE STEVENS INSTITUTE.--NOVEL RESEARCHES BY PROFESSOR MORTON CONCERNING THE INDUCED CURRENT.

The first of a course of public lectures on electricity was recently delivered by Professor Morton, at the Stevens Institute of Technology, Hoboken, N. J., before a large and intelligent audience.

The lecturer introduced his subject with a few simple, but suggestive, experiments, showing the attraction and repulsion of pith balls and gold leaf very plainly, by throwing their magnified image on the screen. He mentioned that although glass was the substance generally used as an insulator, it was not by any means perfect for the purpose, and pointed to a series of Leyden jars which were entirely useless as a reservoir of electricity, owing to the poor insulating power of the glass.

Vacuum tubes were passed among the audience, each tube having sealed within it a smaller tube, with bulbs blown along each inch of its length; in the space between the smooth outside and the bulbed inside tube, was placed an ounce of mercury; on suddenly inverting the instrument, the mercury, in its descent, would strike against the bulbs of the inner tube, producing friction, and consequently electricity, of which the effect could be seen as a violet or purple colored light following the mercury.

The subject of electrical induction was next introduced, with a simple instrument called the electrophorus, and a Holtz machine; then followed a series of experiments with induction coils. A Giessler tube was caused to revolve rapidly by means of a small magnetic engine. When the induced current was transmitted through the revolving tube, it produced the effect of a handsome piece of fireworks. A wire, with strips of paper fastened at one end, was connected with the inner coating of a Leyden jar. On charging the jar with the long sparks of induced electricity from the induction coil, the strips of paper would be repelled and stand out from each other, but on discharging the jar they would instantly drop. A chime of bells was rung on the same principle, and would continue to ring for twenty minutes with one charging of the jar.

Professor Morton mentioned that he believed he was the first to discover that the induced or secondary current of the Rhumkorff coil was capable of producing attraction and repulsion, similarly to frictional electricity.

An electrical orrery was set in motion by the induced current escaping from points, and reacting on the air; a lighted candle, held near one of the points, was almost blown out.

The speaker closed the lecture with some brilliant experiments with the large coil of the Institute. Wood was torn up, and gunpowder was only scattered with one electric flash, which lasted the six billionth of a second, but ignited by another of longer duration, about the six or eight hundredth of a second. The last experiment, that of causing the induced electricity to penetrate blocks of glass, was received with well deserved applause; the assistants brought in two heavy columns of glass, each having a metal rod running through its middle; thick varnish was poured on the top face of one column, and the block of glass to be penetrated placed on the varnish. More varnish was then poured on the block, and the other column placed on top. The principle was simply to bring two very well insulated electrodes together, with the block of glass between them; the object of the varnish was to render the path through the glass the easiest course for the electricity. The terminal wires of the secondary coil were connected with the rods in the columns of glass. It was very interesting to observe the effect of the strange force struggling through the glass; the electricity would penetrate perhaps an eighth of an inch, and then, as if the resistance were too great, it would dart back and run around the outside of the block, turning the corners and scattering the layers of varnish; then again the current would make a new attack, penetrate deeper and deeper, until at last the bright streams of light passing entirely through the glass announced the electrical success.

The Professor exhibited a block of glass three inches thick (penetrated in this manner), by throwing the light through it and on the screen; two plainly marked cleavage lines showed the electric path through three inches of solid glass.

L. D. D.

THE CHRISTIAN LEADER.

The *Christian Leader*, the organ of that body of religionists known as the Universalists, has just made its appearance in a new and improved form, to wit, the large quarto shape. Its readers are now presented with twenty pages of matter, handsomely printed. The new publisher is Mr. M. K. Pelletreau, and his name alone is a sufficient guarantee for the elegance of the typography. Office No. 8 Church street, New York; subscription $2.50 per annum, chromo included. The new editor is E. H. Chapin, D. D., who, as everybody knows, is not only an able and popular writer but he is also a most eloquent speaker. Under this new editorship and management, the *Leader* will undoubtedly take the place in the ranks of religious journalism which its name so appropriately implies. The editor in his address says: "In our day, the human mind is much engaged with problems that involve the highest interests of our being. It may be an age of religious doubt and dislocation, it is not an age of religious indifference. These things appear, not because men are apathetic, but because they are in earnest. Trained by the scientific culture of the times to face the facts of nature, they demand facts and not assertions in every department of human faith and teaching."

IN education, science is invaluable as the sole means of training and invigorating the intellect.