

us that the prize offered by the Legislature has stimulated invention in the wrong direction. It is scarcely possible to give a canal boat the form required for a steamer, without seriously reducing the carrying capacity. It would seem better, then, to place the engine on a separate vessel, which could be properly designed, letting this vessel take the place of horses to tow the canal boats.

A YEAR'S INVENTIVE PROGRESS.

The following schedule indicates the progress of invention in the United States during the year 1873, and consists in a list of the number of patents issued by the United States Patent Office to citizens of each State and Territory, to foreign subjects, and to members of the Army and Revenue-Marine Service. The table also shows the relative ratio of patents obtained to the population of each political division:

To citizens of	Number of patents.	Population to each	To citizens of	Number of patents.	Population to each
Alabama.....	13	23,135	Montana Territory..	3	6,883
Arkansas.....	11	44,042	Nebraska.....	28	1,393
California.....	251	2,332	Nevada.....	19	2,236
Colorado Territory..	4	4,983	New Hampshire.....	127	2,506
Connecticut.....	622	890	New Jersey.....	614	1,475
Dakota Territory...	20	7,090	New Mexico Ter....	1	91,874
Delaware.....	43	31,230	New York.....	2,826	1,551
District of Columbia	109	1,208	North Carolina.....	58	18,472
Florida.....	8	22,468	Ohio.....	832	3,208
Georgia.....	53	22,311	Oregon.....	19	4,785
Idaho Territory.....	1	11,939	Pennsylvania.....	1,639	2,148
Illinois.....	844	3,009	Rhode Island.....	167	1,301
Indiana.....	311	5,404	South Carolina.....	25	28,224
Iowa.....	246	4,854	Tennessee.....	105	11,986
Kansas.....	75	4,859	Texas.....	109	7,510
Kentucky.....	114	11,590	United States Army	8	3,750
Louisiana.....	96	4,510	U. S. Rev. Marine..	1	10,848
Maine.....	139	4,088	Utah Territory.....	8	3,914
Maryland.....	191	1,057	Vermont.....	76	16,120
Massachusetts.....	1,379	3,226	Virginia.....	6	3,992
Michigan.....	110	2,397	Washington Ter....	42	10,524
Minnesota.....	57	15,453	West Virginia.....	2	4,860
Mississippi.....	394	3,973	Wisconsin.....	217	4,859
Missouri.....			Wyoming Territory	3	1,359

Total to citizens of the United States 12,371, or one patent to each 3,116 of the population. Total granted to citizens of foreign countries, 491. Grand total, 12,862, which includes reissues and designs, but not trade marks.

With reference to sectional distribution, the foregoing schedule reduces itself to the following:

Middle States.....	5,119	Territories and the District of	
Western States.....	3,038	Columbia.....	140
North Eastern States.....	3,521	United States Army and Revenue Marine.....	9
Southern States.....	1,374		
Pacific States (Cal. & Oregon).....	270		
Total.....	12,371		

By inspection of these data it is shown that, as compared with the number of patents issued in 1872, the aggregate of 1873 is smaller by 140 for citizens the United States, and by 31 for dwellers abroad. Considering numbers merely, New York stands first, with 2,826, and New Mexico and Idaho last, with but 1 each. Connecticut, however, fairly heads the list, as relative population must also enter into the calculation; her ratio is 1 patent to every 860 souls. The District of Columbia is next, with a proportion of 1 to every 1,208. Arizona and Alaska are entirely unrepresented, and New Mexico has but a single patentee for 1873 among her whole population of 91,874. The Southern States still present a low average; and in proportion to their population, fall behind all the rest of the country. A slight increase of four patents is noticeable over the aggregate of 1872. The list of States which show an increase over last year includes the following: Alabama, California, Iowa, Kansas, Louisiana, Maryland, Minnesota, Mississippi, Missouri, Montana, Nebraska, New Hampshire, New Jersey, North Carolina, Pennsylvania, Tennessee, Texas, and Washington Territory, also the United States Army. The remainder have decreased or else remained stationary.

It may be added as an interesting and perhaps significant fact that, in the four political divisions in which the least number of patents have been granted, the circulation of the SCIENTIFIC AMERICAN is the smallest; and in other States, the ratio increases in proportion to the circulation of this paper among its inhabitants. Thus in New York, the State having the largest number of patents, our patrons exceed those of any other State; while in New England and the West, whence, as the statistics show, the most inventions emanate, the SCIENTIFIC AMERICAN has the greatest circulation.

PROCEEDINGS OF THE PATENT CONVENTION.

The Patent Convention, the call for which was recently alluded to in our columns, began its labors at Washington, on January 15th. Some two hundred delegates were present. The following is the organization:

President, J. M. Thacher; Vice Presidents, N. R. Graham, W. W. Wood, H. E. Towle, Miles Pratt; Secretaries, J. C. Bancroft, W. C. McIntyre, and C. F. Stansbury. The resolution of the Vienna Congress, declaring that the protection of inventors should be guaranteed by the laws of all civilized nations, for the reasons given, was adopted. The second resolution, declaring that an effective and useful patent law should be based on the principles set forth was modified by adding:

"A patent should be granted for a term of seventeen years, with a privilege of extension for the benefit of the inventor or his heirs for a further term of at least seven years." Several resolutions were offered touching upon the inventors' interests and the patent laws of the United States. C. M. Parks presented a resolution, recommending that Congress make use of the surplus fund of the Patent Office, now in the United States Treasury, for the erection of a suitable building in Judiciary square, for the exhibition of the models of inventions. This fund is stated to be over \$1,000,000. Further reports in our next.

VERMIN KILLER.—Doré patents the use of the following mixture for the destruction of bugs, fleas, ants, etc., and their eggs: Bisulphide of carbon 80 parts; petroleum essence 20 parts. The liquid is to be applied to furniture, etc., by a brush.

PSYCHIC FORCE.

Some time ago we published an account by Dr. William Crookes, the distinguished scientist of London, editor of the *Quarterly Journal of Science, Chemical News*, etc., of his experiments and observations in connection with the phenomena of Spiritualism. We gave engravings of the special apparatus designed by Dr. Crookes for the purpose of detecting the fraud, if any existed, and of measuring the actual degree of invisible force that was alleged to be exerted. This apparatus consisted of a self-registering balance, which, to the surprise of the Doctor and his friends, went down before their eyes and registered a considerable degree of force, when the medium, Home, simply pointed his finger at the balance, but did not touch it. The force thus manifested was designated psychic force by Dr. Crookes. The publications of the learned Doctor attracted much attention at the time, and subjected him to the severest ridicule among the learned. He however promised to pursue the investigations and publish further reports. This he has now done, and announces his intention to give still further details. Most of the wonders which he now describes took place in his own house, and were witnessed by parties of friends, all of whom give concurrent testimony as to the actuality of what is stated.

These spiritual performances seem to involve something which, as Lord Dundreary would say, "no fellow can find out," and the Psychic Force theory of Dr. Crookes is perhaps as acceptable as any, while none of them tell us how the thing is done. None of the doings here recited surpass the tricks of the magician Hartz of this city—the box trick, for example, recently mentioned by us. The box is first tied up and sealed, then entirely folded up within a canvas sleet, and again tied and sealed, all being done by a committee of detectives before the audience. Into this box, in the course of two minutes time, Hartz then introduces a man, without disturbing the canvas envelope, ropes or seals. Other equally curious performances might be mentioned, which, we believe, have never been explained.

A correspondent of the New York *Tribune* says that, in classifying the various phenomena that have presented themselves to him in the course of his enquiries, Mr. Crookes refers, first, to the movement of heavy bodies, with contact but without mechanical exertion. This he states to be one of the simplest forms of the phenomena observed, varying in degrees from a quivering or vibration of the room and its contents to the actual rising into the air of a heavy body when the hands of the medium are placed upon it. These movements, and indeed most of the phenomena, are preceded by a peculiar cold air, sometimes amounting to a decided wind, sufficient to blow a sheet of paper about the room and to cause a lowering of the thermometer by several degrees.

The second class manifested themselves as percussive and other allied sounds; sometimes as delicate ticks; sometimes a cascade of sharp sounds, as from an induction coil in full work; detonations in the air, sounds like scratching, twittering as of a bird, etc. The third class of phenomena consists in the alteration of the weight of bodies. The fourth class, namely, the movement of heavy substances when at a distance from the medium, he has seen in many instances. An empty arm chair, at his request, moved to where he was sitting, and then slowly back again, a distance of about three feet. He has seen the movement of a heavy table, and chairs turned with their backs to the table, about a foot and a half off, each occupant kneeling on his chair, with hands resting on the back, but not touching the table. The fifth class is that of the raising of tables and chairs off the ground, without contact with any person.

The sixth class is that of the levitation of human beings, which has occurred in four instances in his presence. He has seen Mr. Home raised completely from the floor of his room in several instances. The accumulated testimony, establishing Mr. Home's levitations, Mr. Crookes considers overwhelming; and he thinks it greatly to be desired that some person, whose evidence will be accepted as conclusive by the scientific world, shall seriously and patiently examine these alleged facts. The seventh class of phenomena consists in the moving of various small articles without contact with any person, which he has very frequently observed, and where there could be no suspicion of trickery. He thinks that when he is in his own dining room, seated in one part of the room, with a number of persons keenly watching the medium, the latter could not, by any trickery, make an accordion play in his (Mr. Crookes') own hands, when the keys are held downward, or cause the same accordion to float about the room, playing all the time. He thinks it impossible to introduce machinery which shall wave window curtains; pull up Venetian blinds eight feet off; tie a knot in a handkerchief and place it in a remote corner of the room; sound notes on a distant piano; cause a card plate to float about the room; raise a water bottle and tumbler from the table; make a coral necklace rise on end; move about a fan so as to fan the company, or set in motion a pendulum when enclosed in a glass case firmly cemented to the wall. The eighth class is that of luminous appearances. He has seen a solid self-luminous body, of the size and nearly the shape of a turkey's egg, float noiselessly about the room, being visible for more than ten minutes, and striking the table three times, with a sound like that of a hard solid body, before fading away. He has seen a self-luminous crystalline body placed in his hand by a hand which did not belong to any person in the room, and a luminous cloud floating upward to a picture. In the daylight he has seen a luminous cloud hover over a heliotrope on a side table, break off a sprig, and carry the sprig to a lady; and on several occasions he has seen a similar luminous cloud visibly condense to the form of a hand, and carry about small objects.

The ninth class consists of the appearance of hands, either self-luminous or visible by ordinary light. In one case a small hand rose up from an opening in the dining table and gave him a flower. The hands and fingers do not always appear solid and life-like, sometimes indeed seeming like a nebulous cloud, partly condensed in the form of a hand. He has more than once seen first an object move, then a luminous cloud appear to form about it, and lastly, the cloud condense into shape and become a perfectly formed hand. At this stage it was visible to all present. Sometimes it was life-like and graceful, the fingers moving and the flesh apparently as human as that of any person in the room. At the arm or wrist it became hazy, and passed off into a luminous cloud. To the touch the hand appeared sometimes icy cold and dead, at others warm, grasping his own with the firm pressure of an old friend. In one instance he retained one of these hands in his own, firmly resolved not to let it escape. There was no struggle, no effort to get loose, but it gradually seemed to resolve itself into vapor, and faded in that manner from his grasp. The tenth class comprised direct writing, exhibited sometimes in darkness, sometimes in light, sometimes without any apparent agency, at others through the medium of a hand. The eleventh class embraces the rarest phenomena, namely, those of phantom forms and faces, which he witnessed in a few instances only. The twelfth class covers phenomena that seem to point to the agency of an exterior intelligence, other than that of the medium or some person in the room. Although the hypothesis has been suggested that the medium is the source of this intelligence, by those who think they see in this an explanation of many of the facts, yet Mr. Crookes has reason to believe that, in certain instances at least, they result from the agency of an outside intelligence not belonging to any human being present.

SCIENTIFIC AND PRACTICAL INFORMATION.

EXTRACTION OF QUICKSILVER AT NEW ALMADEN, CAL.

The mineral is treated as at Idria, that is, it is roasted in great cylindrical furnaces in which it is placed between successive layers of wood. The mercurial vapors are condensed in walled chambers. The presence of time in the minerals greatly facilitates the disengagement of the metal. 4,400,000 pounds of mercury are thus yearly obtained at an expense of about \$27 per 100 lbs. At Almaden in Spain the annual product is 2,200,000 pounds, costing from \$90 to \$180 per 100 pounds.

A NEW USE FOR INFUSORIAL SILICA.

Infusorial silica has been strongly recommended for surrounding ice, ale, and beer cellars, fireproof safes, steam boilers, and powder magazines. A firm in Germany have recently made a series of experiments on a large scale, and they assert that the use of this earth has reduced the melting of ice in a cellar during the summer from 23,500 to 10,000 pounds. This material is not inflammable, and is not in the least affected by the hottest fire; and it prevents the entrance of rats and mice.

ELECTRIC DISCHARGES IN AIR.

By allowing a series of sparks from an electromagnetic induction apparatus to be discharged between platinum electrodes in perfectly dry air, Böttger noticed the formation of yellow vapors; and after the lapse of a few minutes, nitrous acid was recognized by the smell. If the sparks are passed through very moist atmospheric air, or if the sides of the glass vessel in which the experiment is conducted are moistened with distilled water, and some is allowed to collect at the bottom, no yellow vapors are formed; but the air, in a few minutes, acquires the characteristic odor of ozone, while in the water the presence of hyponitric acid can be detected. Iodide of potassium and starch paper, the test in common use for the detection of ozone in the air, is thus shown to be an untrustworthy reagent, as it must in many cases turn blue by nitrous acid. It behoves meteorologists, now that their attention has again been directed to these facts by Professor Böttger, to ascertain the exact condition of moisture under which the acid is produced, and to establish a process for the estimation of ozone, which shall be of absolute certainty.

Dr. Dotch of New York, who has for years occupied himself with the artificial generation of ozone, states that strips of paper saturated with the tincture of guaiacum afford a more sensitive and certain reagent or test for the presence of ozone than either the iodide of potassium and starch or paper containing protoxide of thallium; and that such an ozonometer can be relied on to show at least 10 gradations or shades.

SCIENTIFIC GHOULS.

The tomb of Petrarch was recently opened on the occasion of the centenary of the poet. The bones were found in quite perfect condition and of an amber color; other than which, we fail to note a single fact of the slightest interest in the long account of the ceremony published by a foreign contemporary. It strikes us that the spectacle of a body of scientists, calling themselves the "Academy of Bovolenta," breaking open the grave of a great man, pawing over his bones, and glaring at his dust through their eyeglasses, with apparently no other object than to make him share his coffin with a bottle containing a list of their names, must be refreshingly idiotic.

OZONIZED WATER.

Ramelsberg states that some of the substances sold as ozonized water owe their action to the presence of chlorine. Behrens and Jacobsen, on the other hand, find that some ozonized water is only a dilute solution of hypochlorous acid.