first conceived the idea of a machine gun, which has been ever since the great controlling idea of my life; and it certainly cannot be regarded as egotism when I express the belief that I am the originator of the first successful weapon of the kind everinvented. A brief history of this arm may esablish the fact, and cannot fail to engage the attention of all who take an interest in fire-arms.

I completed my first "battery," or "machine gun," in the city of Indianapolis, State of Indiana, my place of residence, in the early part of the year 1862, and my first American patent bears date November 4th, of the same year. The gun was fired repeatedly during that year, in Indianapolis, in the presence of hundreds and thousands of persons, over two hundred times a minute, and the result published to the world.

In the autumn of 1862, I went to the city of Cincinnati, in the State of Ohio, and in the well-known establishment of Miles H. Greenwood & Co., I had six of my guns constructed; but about the time they were completed the establishment was destroyed by fire, together with the guns, patterns, and drawings, subjecting me to a very heavy pecuniary loss. Shortly afterwards, I had twelve of my batteries manufactured at another establishment in the same city. In the meantime, I continued to fire my gun, made at Indianapolis, before the citizens of Cincinnati, and in the presence of many Army Officers of rank and distinction, all of whom were highly pleased at the result of its performance. The American press of 1862 and 1863 teemed with accounts of these trials, and during all this period no notice of a similar weapon, at least none equaling or approaching the "Gatling battery," in the rapidity of its firing, appeared in any of the papers published in America or Europe.

I made no effort to keep my invention a secret, but, on the contrary, published full descriptions of the gun, with cuts and diagrams, and sent the same to all parts of the civilized world. Istated in these descriptions that my invention consisted of a 'series of barrels," parallel to each other, arranged around a central shaft, and that "each of the barrels was furnished with its own appropriate lock, or firing mechanism;" I also described it as a "compound machine gun," that is, many guns in one. At the time I made these publications, that "mysterious" French mitrailleuse, of which we have since heard so much, was not invented, and, in my opinion, not even thought of. It is well known that the French and Montigny mitrailleuses are composed of a number of barrels, and have a lock or firing device for each barrel, and, for reasons submitted hereafter, I have no hesitation in saying, that this feature of a gun, formed of many barrels and many locks, is copied from my invention.

I continued to make my guns in Cincinnati during the years 1863 and 1864, and in the autumn of the latter year, I made additional improvements to my battery—in the locks and rear cam—but without, however, changing its main features, for which I secured a second patent of the United States, bearing date May 9th, 1865.

In the years 1865 and 1866, these improved guns were manfactured at Cooper's Fire Arms Manufactory, in the city of Philadelphia, but since that time they have been constructed in large numbers, at Colt's Armory, in the city of Hartford, where machinery has been fitted up at great expense, to build the guns in the highest style of perfection.

This gun is now on exhibition at the Fair of the American Institute in this city.

COMPARATIVE ACCURACY OF MERCURIAL AND ANEROID BAROMETERS.

During the progress of the recent official surveys for the ship canal across the Isthmus of Darien, the level lines were ascertained by spirit levels, and also by barometic observations. The mercurial and the aneroid barometers were employed, and their indications were, from point to point, compared with those of the spirit levels. The result showed that the aneroid barometer was very unreliable, as its indications of level were frequently in error to the extent of one hundred feet, while the average deviation of the mercurial barometer from the spirit level, did not exceed twelve feet.

Our readers are, of course, familiar with the construction of the mercurial barometer, in which a column of quicksilver, 30 inches high, counterbalances the weight of a column of the air, of the same diameter, and 100 miles, more or less, high. When we rise above the sea, the weight of the air diminishes, and at an altitude of 5,000 feet the mercury column stands at 24·77 inches, instead of 30 in. as at the sea level. The hight of hills and mountains may therefore be measured by placing the barometer at the highest point of elevation, and observing the position of the mercury.

The mercurial barometer was invented in 1643, by Torricelli, an Italian, a disciple of the famous Galileo. The term barometer is derived from Greek words signifying "weight-measurer."

The aneroid barometer is a more recent invention. It is made wholly of metal, and consists of an air-tight box, which may be described as somewhat resembling a common tin blacking-box, except that the edges of the barometer box are creased so that the flat faces may spring towards or from each other, when pressure is applied to them. One of the faces is connected with a delicate wheel mechanism and a pointer by which the slightest movement of the box face is indicated to the eye. The interior of the box is charged with hydrogen gas, and the faces are so set that at the sea level the pointer will stand at a given degree, say 30. Any variation in the pressure of the air will alter the position of the faces of the box in respect to each other, and the change will be indicated by the pointer.

The aneroid barometer has come into very extensive use, and has heretofore been considered a reliable and excellent instrument. During a voyage across the Atlantic, we once compared the relative merits of the mercurial and the aneroid barometers. The ordinary indications were the same with both instruments; but the aneroid was considered preferable by the officers of the vessel as it was more sensitive to atmospheric changes than the mercurial. The aneroid always indicated the approach of bad weather, or the change to fair, in advance of the mercurial instrument.

It may be that the aneroids used on the Darien expedition were in some manner defective.

The aneroid barometer is a very neat and compact instrument, not easily broken, readily transported, and very serviceable. It was invented about twenty-two years ago by M. Vidi, of France.

The term aneroid is from Greek words, which signify "without fluid;" no mercury being employed in the aneroid barometer.

FAIR OF THE AMERICAN INSTITUTE.

We have noticed in order certain departments of this Fair, and for the future shall select for notice from the other departments such things as may seem of interest, without regard to strict classification.

Among these we find a patent machine for "spreading" flax, hemp, etc., which takes the material from the bale, and lays its fibers all parallel, turning them out in a continuous sliver in a very expeditious and beautiful manner. The hemp or other similar material, in the condition in which it is ordinarily taken from the bale, is placed upon the feed-board, and gradually brought to feed-rollers, which convey it at the requisite speed to and upon an endless chain apron covered with heckling pins, which measurably straighten and comb its fibers. From this it passes to another endless chain, running at higher speed, the pins of which complete the heckling operation. The hemp is thus combed and drawn out by the pins of the two endless chains, while the fibers are free at one end to accommodate themselves to such action. The hemp then passes therefrom to pressing and drawing rollers, which, having performed their function, the material passes through condensing tubes in the form of a sliver. To any who delight in examining the workings of well devised machinery, the operations of this machine will prove gratifying. The machine is exhibited by John Good, of Brooklyn, E. D., N. Y.

A cotton seed hulling machine is shown by T. M. Jewell, 93 Liberty street, New York. It is designed for plantation use and can be run separately from the gin, or attached to the gin and driven by the same power. When run by itself it is driven by the power of two mules. It is claimed to remove the hull and lint entirely from the seed and to leave the kernel unbroken. At the same time the kernels are dried and cleaned by an air blast, and, it is claimed, rendered fit for shipment to any distance. Our readers who have perused the valuables article on "Cotton Seed" and "Cotton-Seed Oil," published in our last volume, will be prepared to appreciate the value ot a machine that will do what is claimed for this one.

A line of power and foot punching presses shown by N. C. Stiles, Middleton, Conn., is worthy of notice. Tbose interested in this class of machines, and who visit the Fair, will do well to look at them.

Shaw's Patent Gunpowder Pile Driver, exhibited by the Gunpowder Pile Driver Co., 505 Minor street, Philadelphia, attracts much attention. This novel and ingenious device was fully described and illustrated on page 97, Vol. XXI., of Scientific American. For the short time this invention has been before the engineering public it has made a brilliant record.

A flax scutching machine, shown by William McBride, Somerville, N. J., is also a very ingenious device. The flax is fed in under an endless belt, the belt pressing upon the middle of the fiber, and holding it firmly while it passes and is acted upon by a series of revolving scutching blades which dress one end of the mass. Then the machine turns the other end of the flax fiber, so that it in turn passes another series of scutching blades, and finally delivers it well dressed for future operations.

FIRE-ARMS.

Under the superintendence of Col. Geo. Woodward, 304 West street, New York, this department has been made a most attractive feature of the Fair.

Col. Woodward represents nearly or all the first class manufacturers of fire-arms in the United States, and his politeness and affability, his intimate knowledge of the arms exhibited, and his readiness to explain to the curious the peculiarities of the weapons shown, render this department a rare opportunity for any who wish to post themselves on the subject of modern fire-arms. Most of the guns shown are breech-loaders, and are made in the very highest style of the art.

A prominent object in this connection is the Gatling battery gun, quite recently described and illustrated in this journal, exhibited by Chas. H. Pond, 179 Broadway, Agency, Winchester Arms Company and Gatling Gun Company. We need not here repeat any details of this remarkable arm, which as a destructive weapon is probably unexcelled by any similar piece ever constructed. The same exhibitor shows a case of the Winchester repeating arms.

The Winchester rifle differs from the Henry rifle only in the mechanism by which the cartridge is extracted. It is claimed for this gun that it can not only be fired thirty times a minute continuously as a repeater, but it can be used as a single loader without any attachment to be changed for the purpose, retaining the magazine full of cartridges to be used in any emergency, when the whole fifteen charges can be fired in fifteen seconds, or at the rate of sixty shots a minute, or in double-quick time, in seven and a half seconds, or at the rate of 120 shots per minute, or two shots per second, loading from the magazine.

The Providence Tool Co., Armory, Providence, R. I., exhibit a case of the Peabody breech-loading fire-arms. In these arms no movement of the barrel or any other parts, except those immediately connected with the breech block, is required in the performance of any of the operations. The mechanism is designed to prevent any possibility of obstruction from the effects of friction, rust, or exposure to dust, rain, and continued service. The condition of the breech block, when the guard is drawn down, is such as to form an inclined plane, sloping towards the breech of the barrel, and the groove on its upper surface corresponding precisely with the bore of the gun, facilitates the entrance of the cartridge, so that it slides directly into its proper position without the necessity of looking to see that it is properly inserted. The removal of the empty cartridge is effected by the action of an elbow lever, which throws it out the instant the guard is lowered. This lever derives its power from the action of the breech block itself, and is not dependent upon any spring and is of such strength as to seemingly prevent the possibility of breakage or derangement by any service to which it can be exposed.

Ward & Co., 57 Wall street, New York, show a case of the Ward-Burton breech-loading rifles. The Ward-Burton gun is constructed on the bolt or needle gun system, and is operated by holding the piece in the left hand below the lower band, in the position known in the manual for muzzle-loading arms as "prime," and seizing the handle of the breech with the right hand, nails uppermost. The breech is then opened by turning the handle up and withdrawing it to its full extent of motion, a cartridge taken from the pouch with the right hand and dropped bullet end to the front in the now open receiver, and the breech closed by reversing the motions required to open it. By the motion of opening the breech to reload, the empty cartridge shell will be ejected. The breech, however, may be closed during the act of raising the gun to the position of aim. A manual to load and fire by command in six motions may thus be readily devised. Practically, to load and to fire require but four motions.

S. Remington & Sons, of Ilion, N. Y., show a collection of the various arms manufactured by them. These arms are too well known to need any special description here. The exhibitors are now supplying arms to Egypt, Italy, France, Austria, and Denmark; France at present taking all the available stock. The details of the guns thus furnished to foreign governments vary in nothing except the form of the bayonets. The bayonets on the Egyptian guns are sabers, with hilt and guard; the others are triangular.

Isaiah Woodbury, 39 Broadway, New York, exhibits specimens of the "Roberts" Breech-loading Musket. This arm is constructed strictly on the lever plan, having lever strength for its entire operation. The breech plug is a lever, the extractor is a lever, and the "catch" that holds the breech plug in place for firing is a lever. These are the principal pieces that take the wear and tear of fire-arms; they are all of great strength, and so mechanically combined as to receive the recoil shock of the charges without cross strain or disposition to displacement.

The Sharp's Arms Co., of Hartford, Conn., exhibit their infantry carbines and repeating rifles. These celebrated arms are fine specimens of mechanical art, and have a reputation so widely extended that we need not dwell upon the prominent features of their construction.

M. W. Robinson, of 79 Chambers street, shows a fine group of the Wesson sporting rifle pistols, and a case of Smith & Wesson's well-known revolvers

J. W. Storrs, 252 Broadway, New York, shows specimens of the "Central Fire" breech-loading shot guns manufactured by the Wesson Fire-arms Company, Springfield, Mass. These guns are beautiful pieces of workmanship, and will be admired by all sportsmen who examine them. The same exhibitor shows specimens of J. Stevens and Co.'s breech-loading pocket rifles, each of which weighs only eleven ounces, yet shoots with great accuracy and power from thirty to one hundred yards or more; can be loaded and fired five times a minute, can be carried in a side pocket while working in the fields, ready to bring down game at short notice.

Isaiah Woodbury, 39 Broadway, New York, shows some electric batteries and battery fuses for blasting purposes, in which the spark which ignites the powder is generated by frictional electricity. We regret that we could not obtain any information in regard to the details of the internal construction of his device.

Near the collection of fire-arms in one of the alcoves may be seen the screw steering apparatus illustrated and described on page 111. It is exhibited by the manufacturers, James L. Jackson & Bros., 315 East Twenty-eighth street, New York.

We noticed, also, near the entrance to the Machinery Department, a novel and ingenious printing press, called the "Chromatic" press, which prints in three colors with a single impression, and does its work as rapidly as any platen press can print in single color. The surface of the inking cylinder is divided into three equal parts, which are supplied with adjustable sectors (or color strips) of various sizes, to correspond in width with any line or part of line of type. Each part is supplied with a color from one of the distributing rollers. The cylinder has lines struck on its surface which are numbered to correspond with lines and numbers on the chase, making simple work for the pressman to set his sectors to correspond to the lines of the type which he may wish to print in colors. Thus, having the sectors arranged, they receive their proper colors and transfer them to the type rollers, corresponding in width and position with the lines of the type to be printed. Within one minute the press may be changed from two or three colors to one, by means of throwing two polished shells or half cylinders over the color arrangements, which enables the pressman, if he desires, to use three times the amount of distribution and inking surface that he now has in any one-color job press.

Those interested in ice manufacture and ice machines will soon have the opportunity to see the celebrated Carre apparatus at work in a special room assigned to it at the rear of the building. A skating ring 24x10 feet, and laid with ice eight inches thick is promised as soon as the machine gets under way. This will be a most interesting feature of the