

Inventions.

Mr. Horace L. Arnold, in the American Wheelman, is correct in saying that a great deal has been written to exactly define what constitutes invention. Some very skillful and ingenious minds say there is no such thing as invention, and others advocate the view that the simplest and most obvious combination of old and well known elements is an invention. One view makes nothing whatever an invention, and the other makes anything an invention and the proper subject of a patent in case it has not been "anticipated" by exactly the same combination.

The courts are constantly called upon to decide whether the "subject matter" covered by the claims of a patent is an invention or the mere handiwork of a skilled workman, and sometimes the courts decide that what seem to be really intricate inventions are not inventions at all, or that extremely simple things are real inventions and fit subjects for patents.

The point of view seems to be this: If the alleged inventor has done no more than a mechanic skilled in the art might do in the way of meeting the demands of the situation, he is not an inventor, he has not made an invention, and should not have a patent. But if what the alleged inventor has done was a stepping out of the beaten path, and required original thought, which may be defined as either finding new and better answers to old questions, or the first sufficient answer to a new question, then the result of his thought is invention, and the fit subject for a patent.

For illustration, take a cycle frame of the now universally adopted "diamond" pattern, made of tubing. The use of tubing could never have been the subject of a patent, because any skilled mechanic knows that a large hollow thing is stronger and stiffer than a small solid piece of the same weight. But had the "diamond" frame been brought out complete, all at once, by one designer in its present form, that arrangement of frame members would have been an invention, and might have been made the subject matter of one of the most valuable patents ever issued. In fact, the "diamond" design for a cycle frame was of slow growth, and the outcome of successive approximations. Even so, it seems quite likely that had the man who was first to combine these preceding approximations, and produce exactly the now universally used form of the diamond frame, applied for a patent, he would have had it issued to him and it might have been sustained by the courts, and every cycle made might now pay a royalty to the lucky Coventry man who, it is said, was the first one to show the diamond frame.

I have said that the courts are continually called upon to decide what constitutes an invention, and some of these decisions are evidence of very clear thinking on the part of the judges presiding. Often several judges sit together on a case, and they are not always unanimous in conclusions; the decision goes with the majority, one of whom writes all the considerations and premises and influencing circumstances which lead the majority of the judges to their decision, and this goes on file and into print as the opinion of the court in the matter. Sometimes where the decision is not unanimous a dissenting judge writes a little dissenting opinion, and that is printed, too; but the dissenting opinion does not carry weight, although where all the judges concur the decision has a better front.

In a very recent decision it was decided that the direction in which a little hole drilled in cast iron was inclined was a matter of invention, and properly the subject of a patent, even in the face of the fact of previous unintentional use. The invention related to those gas fireplace logs which have asbestos moss on them and look, when in use, as if they were being burned, although the fire is really that of burning gas only. It is desirable that the gas flame should lie close to the cast iron fire logs, and that there should not be a little explosion when the gas is turned off. If the little holes through which the gas comes out of the hollow cast iron fire log to be burned are drilled at a sharp angle to the surface of the log, then the flame does lie close, and there is no explosion at the time of starting or stopping the fire. Yet, as the logs are half round and were laid on a driller table to have several rows of holes drilled in them, it had always been the practice to drill part of the holes inclined and part at nearly right angles to the surface of the fire log. The invention claimed lay in drilling all the holes at about the same acute angle to the face of the fire log, with the outer opening of the drilled hole higher than the inner opening, which avoids the explosion and makes the flame lie close to the log, and gives more heating effect for the same amount of gas burned.

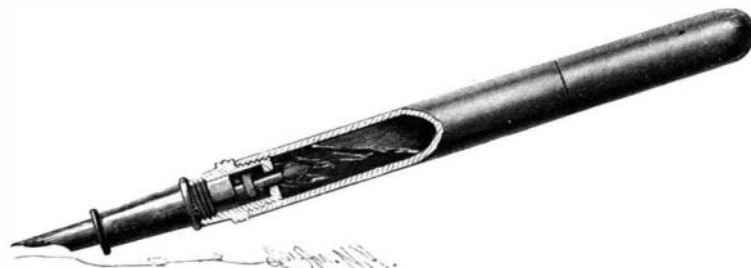
At first sight it would seem that this was a very thin invention; it was shown, however, that it was of commercial value, as making a better and more economical fire log, and it was held that the previous accidental drilling of angular holes lacking uniformity of angular direction was merely slovenly work, while the drilling of the holes all at about the same angle to produce cer-

tain valuable results, and the gaining of these valuable results by this intentional uniform angularity of the gas jet holes, was invention, and to be considered the more meritorious because of its extreme simplicity.

In general terms, if a new and valuable result is gained, no matter how simple and slight the changes made to gain the novel effect, the courts sustain the patent. It is hard to avoid the conclusion that there was original reasoning used to gain a new effect from very slightly modified well known means, and when, as is often the case, the new effect gained by such a slight change in old means is commercially valuable, the patent is almost always sustained.

THE "CLIMAX" FOUNTAIN PEN.

The illustration represents a new fountain pen which forms the subject of two recently issued patents. The pen is designed to write to the last drop of ink, without any liability to leak, and the flow of ink can be easily and instantly regulated to suit the writer or stopped entirely, enabling the pen to be carried point down in the pocket with absolute safety. The chief feature of the pen is that, by means of a nozzle revolving in a plug, the ink duct can be instantly shut or opened, the flow of ink increased or diminished, and all superfluous ink withdrawn from the nib of the pen and stored in cells or basins, where it remains perfectly air bound as long as the pen is out of use. The picture represents a small size of the pen, which is being introduced by the Climax Fountain Pen Company, of No. 130 Broadway, Brooklyn, N. Y. As may be seen in the broken away section, when the nozzle is turned downward into the plug the ink duct is opened, and the ink is forced into the nib by air pressure; but when the nozzle is turned upward the ink duct is closed, and a reversed suction takes place by which the ink is withdrawn from the nib of both the pen and feeder. The feeder is so constructed that, when the flow is regulated, blotting and leaking are impossible, as hardly a drop of ink can be forced out, even by violent shaking. The inside shaft of the feeder has an auto-



THE "CLIMAX" FOUNTAIN PEN.

matically sliding valve keeping the ink always in fine flowing condition, and the pen, when necessary, may be washed without removing any single part, simply by holding it, point up, under the open faucet. Patents have been granted for this improvement in the United States and Canada, and other patents are applied for in England, Germany, France and Austria.

Thomas Jefferson as Meteorologist.*

The following items are extracted from notes furnished to the editor by the gentlemen named below. Further interesting remarks on this subject will be found in articles by Mr. Alexander McAdie, published in the Popular Science Monthly, vol. xiv, p. 331, and in Weather Bureau Bulletin No. 11.

Monticello (in Italian "Little Mountain"), the home of Thomas Jefferson, is on the summit of Monticello Mountain, on the south side of the Ravenna River, in Albemarle County, and three miles southeast of Charlottesville, Va. This mountain, which towers up more than five hundred feet above the general level, commands a magnificent view of all the country to the north and east. The birthplace of Thomas Jefferson, called Shadwell, named after the parish in London where his mother was born, is a couple of miles away.

The general appearance of the Monticello mansion has undergone no alteration or change since Mr. Jefferson's death. The central portion consists of two stories, with a dome surmounting the center; the wings are of one story and attic.

Mr. Jefferson was one of the pioneer meteorologists of this country. He kept daily records of the temperature and other important weather conditions during the greater part of his life; he induced others in different parts of the country to make records simultaneously with his own observations; he collected and charted the results, and drew from them his own conclusions with regard to the character and movement of storms, etc. These conclusions were remarkably accurate, considering the meager data at his command for such investigations. Photographs and engravings of Monticello show on the roof a part of his instrumental equipment, viz., the wind vane, the construction of which is very similar to the modern vane. The vertical rod supporting the vane projects down to the ceiling of the portico, to the lower end of which is attached an

* By Fred. J. Randolph and Fred. L. Francis, of the Weather Bureau, in the Monthly Weather Review.

arrow that indicates by its position on a lettered dial the direction of the wind at any moment, and this can be seen from within the house. Mr. Jefferson made and recorded his weather observations several times each day, and these were not neglected even during the performance of his most important and engrossing public duties. In Paris, during a time when his right arm was disabled, in consequence of a fall, his weather records were made with his left hand. Even during the exciting debate in Congress on the document which he had written, one of the noblest in the annals of the world—the Declaration of Independence—when he was writhing under the bitter criticisms with which it was attacked in some of its parts, his observations of temperature were continued. The record in his pocket memorandum book contains the following entries:

PHILADELPHIA, 1776.

	H.	Mtn.	Deg.
July 1.....	9	0 A. M.	81½
.....	7	0 P. M.	82
2.....	6	0 A. M.	78
.....	9	40 A. M.	78
.....	9	0 P. M.	74
3.....	5	30 A. M.	71½
.....	1	30 P. M.	76
.....	8	10 P. M.	74
4.....	6	0 A. M.	68
.....	9	0 A. M.	72½
.....	1	0 P. M.	76
.....	9	0 P. M.	73½

For his temperature readings Mr. Jefferson used a pocket thermometer.

Work Spent in Pressing Pedals.

In a recent communication to the Paris Académie des Sciences, says Engineering, M. Bouny gives particulars of a series of experiments made to determine the power exerted in propelling a bicycle at different speeds. The method adopted was to take an autographic record of the total force exerted on the pedal throughout a complete revolution. To this end a disk was mounted on the bicycle crank concentric with the pedal pin. The pedal itself was mounted on stiff springs, and points fixed to it traced curves on the disk already mentioned. If no pressure was exerted on the pedal, these latter curves were simple concentric circles; when, however, the rider began to work, the springs on which the pedal was mounted yielded proportionately to the pressure applied, and the curves then drawn showed by their deviation from the circular form the value of the force applied at any part of a revolution. One of the pointers in question measured the force applied in a direction perpendicular to the plane of the pedal, while the other showed the pressure applied parallel to this plane. The latter is by no means an insignificant quantity, as all good riders shove their pedal forward as well as down. The angle the pedal made at any moment with the crank was also automatically recorded.

An examination of the diagrams thus obtained showed, in the first place, that there was no absolute dead point, such as occurs with an ordinary connecting rod and crank motion, and, secondly, that there is always some pressure on the pedal during the rise, the negative work due to which has to be subtracted from that done during the down stroke to obtain the net amount used in propulsion. The experiments were made at speeds ranging from 10½ to 21¼ miles per hour, the machine being run on a wooden racing track. The results, reduced to even English measures by means of a formula of interpolation, were as follows:

Speed. Miles per Hour.	Work done per Semi-revolution.	
	Ft. lb.	
10	18-58	
10½	20-96	
12-5	33-98	
15-0	47-50	
17-5	56-75	
20-0	63-62	
21¼	66-08	

It will be seen from the above figures that the average pressure of the foot required on the pedal increases rapidly with the speed, being at twenty miles an hour nearly three and one-half times as much as at ten miles per hour. Unfortunately, the gear used is not noted by M. Bouny, and so it is impossible to deduce from the above figures the average tractive resistance of the machine at the different speeds. Probably at the higher speeds named a large proportion of the total work done was expended in overcoming atmospheric resistance, and the run of the figures might be changed considerably if the trials were conducted on a roughish road instead of on a smooth track.

IMPROVED hygiene and sanitation have reduced the death rate in the German army from 6.9 per thousand in 1870 to 2.4 in 1894. During the Franco-German war the French lost 23,400 men from smallpox, while the Germans, who had strictly enforced vaccination for thirty years, lost only 300 men from this disease. Since 1873 only two soldiers have died from smallpox in the German army.