A CONTRAST BETWEEN AMERICAN AND ENGLISH ARTISANS.

One secret of the ready adoption of mechanical and other improvements in this country lies in the willingness of American workmen to receive and welcome new labor-saving inventions. Nine out of every ten of them either are or hope to be successful inventors; and all have learned to look upon invention as one of the surest means not only of improving the inventor's condition, but also that of those called upon to build or operate the new machine. In countries where the patent laws do less to foster invention and to create a kindly feeling toward improvements on the part of all workmen, the case is very different. There the prejudice against labor-saving devices is often so strong that workmen will see an industry driven out of their country, and themselves left without employment, rather than change their mode of working. Such suicidal foolishness would be impossible among artisans educated by a liberal patent law to appreciate the ultimate benefit of labor-saving devices.

One of the largest machinists in England recently purchased a valuable invention for making railway carriage and other springs by machinery, but his workmen positively refused to avail themselves of it. It ended in his sending the contrivance to Belgium, together with suitable material, and the springs are actually made there and returned to England.

THE SECURITY OF THE EAST RIVER BRIDGE.

At a meeting of a sub-committee of the New York Assembly Committee on Finance and Navigation, to investigate the charge against the Brooklyn Bridge, some very interesting testimony was taken.

The charges were that the bridge when completed will impede the free and common navigation of the East River; be a serious obstruction to the commerce of New York, and to the growth and prosperity of the port; will not adequately provide a certain and safe mode of travel between the two cities; will not be of any substantial benefit to either, while it will reduce largely the value of property on the East River in both cities; and that it will be an inseeure structure, on account of its great length, and cannot be properly stayed and protected at its great height against strong winds.

Mr. Philip B. Low, a practical ship-rigger, said that he had made measurements of ships' masts and estimates from draughts, and according to these, in his opinion, all ships not exceeding 875 tons burden, with possibly here and there an exception, could pass light and unladen under the bridge at any point where it was 134 feet above the river at half tide; that in his opinion, with the exception of a very few of the largest steamships that always discharge in the North River, and the large pleasure yachts, there were no barks, brigs, or schooners, except the two schooners, the Matilda Cranz and the Frederick, that could not readily pass under the bridge at half tide, and very few which could not do so at full tide; and he thought that there were not more than two ships arriving in this port in a year which would require the housing of topmasts.

Col. William H. Paine, Assistant Engineer of the bridge, testified that the weight of the New York tower masonry was 93,000 tons. The pressure at the bottom of the caisson, on the bed rock, was four and a half tons to the square foot; at the base of the stone work eight tons, and at the base of the center column, between the roadways, and on a level with them, the pressure was twenty-nine and a half tons to the square foot. That was the greatest weight. Stone of a similar character to that of which the tower was built had stood a pressure of 5,000 tons to the square foot.

With regard to the settling of the towers. Col. Paine said that in building the caisson of the New York tower a number of timbers had been bolted together. In this operation there was a gain of 2½ inches, the timbers not coming together. He had expected that the tower would settle at least that much. Careful observations had been made. As the stone work arose above the water, spikes were put in the masonry and careful levels taken. The result was that the tower had settled only 1¼ inch, one half of what had been expected. This settling had been very evenly distributed over the whole surface of the tower.

Touching the strength of the bridge, Col. Paine said that the elements of strength were the towers, the anchorages, and the cables. The anchorages served to hold the cables. There were first four large bed plates of iron. To these were secured chains. There were 60,000 tons of masonry in each anchorage, and of the 60,000 there were 6,639 tons over each bed plate. The strain on each plate would be 1,769 tons. The bars had a strength of 12,875 tons. In every particular there had been an effort to make every part of the bridge stronger than the estimates in the original plan of Mr. Roebling. The strength of the cables was 12,000 tons each. The stays are to assist in sustaining the load. They would pass from the towers down, and be secured to the trusses at various distances. They controlled the weight, so that the bridge would not act; that is, one part sink and another rise. No part of the bridge could sink without a corresponding elevation in another part. The stays prevented this. They sustained a strain of 1,439 tons each, on each side of the bridge. They were the great feature of Mr. Roebling's plan, and made the bridge superior to all others, which were made only with suspenders. These stays prevented the wind under the bridge from lifting it. They also prevented swinging, for they were on an angle, being nine feet further in at the bridge than at the towers. They converged. The force of the wind would bring all the stays and two cables to resist it. There was also a system of heavy stays running from the towers to the opposite side of the bridge. This was an improvement on the Niagara bridge, where the storm stays were attached to distant objects. There they worked against each other, and were more affected by heat and cold.

Being asked to give the strength of the bridge in detail, Col. Paine said that when the bridge was filled with cars, teams, and passengers there would be a distributed strain of 30 pounds per square foot. The bridge was able to stand a strain of 89-100 ton to the lineal foot. It had been calculated that 7,200 teams could pass in an hour, at the rate of 200 feet in a minute; 80 cars could be allowed on the bridge at once, allowing six minutes for crossing; each car would hold 100 passengers. Thus 80,000 passengers could cross in an hour, besides those on foot. The strain on the anchorage was about four times less than the margin of safety; that on the suspenders eight times less. The safe distributed load of the bridge was 1,311 tons. This it could carry safely, and it had a margin of safety of five; that is, when the bridge was filled to its full capacity, it was then able to carry a weight five times greater. The weight of the bridge itself was 5,976 tons.

THE NEUTRAL LINE.—A NOTE FROM MR. GARY.

To the Editor of the Scientific American:

Having read an article on "Gary's Alleged Neutral Line," on page 177, of March 22, and also on page 144, of March 8, I feel assured you will allow me a limited space to present the other side of the question.

It is well known that a bar of iron held with one end near the pole of a magnet becomes magnetized or polarized by induction; that the end of the bar nearest to the pole of the magnet is of opposite polarity to the pole of the magnet, while the other end of the iron is of like polarity. Now, if the end of the iron nearest the magnet is brought in contact with the pole of the magnet, the iron changes its polarity and becomes of the same polarity as the magnet. This is a well known law of magnetism.

We will now suppose the end of the bar of iron is held above the north pole of a horseshoe magnet, the iron will become polarized, the end above the north pole of the magnet will be a south pole, the end farther away will be a north pole. Now, if the north pole of iron is moved around above the south pole of the magnet, it will still be a north pole, and both ends of the iron will be polarized and of opposite polarity to poles of the magnet beneath them. If the iron is now brought in contact with the poles of the magnet beneath it, its polarity is changed; each end of the iron is of the same polarity as the pole of the magnet with which it is in contact.

If a thick piece of iron is used it will absorb or neutralize the magnetic waves when in contact, and show less polarity than when not in contact.

What I claim as my discovery is: *that the iron, if of proper proportions, will change its polarity before it comes in contact with the magnet.* As a proof of this, take a horseshoe magnet of contact power of seven to ten pounds; take a bar of iron from one eighth to one fourth inch thick, long enough when placed across and above the poles for the ends to project out over the poles three or four inches; raise the iron one or two inches above the magnet; put several thicknesses of paper across the poles of the magnet, to keep the iron from contact when lowered down toward the magnet. Now take a common box compass, or any other; hold it level near the end of the iron; lower the iron evenly down to the paper; keep the iron as near as possible between the compass and magnet; do not place the compass too near the iron, as it will or may change the polarity of the needle as the iron changes its polarity. The needle will reverse as it passes the neutral line; or place the needle on the iron, raise the iron and lower it; it will dip one end and then the other as it passes the line and stand level while on it. Or try any experiment by which the old law of the change of polarity is proved in one end of the iron, as it comes in contact, and it will prove, that under the conditions I have named, the polarity changes before it comes in contact.

In regard to the experiment with the nail, the writer, on page 144, says: "It (the nail) falls to the ground simply because, by reason of its approach to the attracting force, it tends to fly to it and it falls to the ground."

Why did not the writer have the fairness to state that the nail, when still nearer the attracting force than the point where it drops off, will cling to it again, and before the iron comes in contact, the point of the nail turning outward, thus showing a change of polarity in the iron?

The writer, on page 177, of March 22, says: "The sheet iron armature being polarized it polarizes the nail which is suspended from it, and that this polarity of the nail is reversed when brought within direct control of the magnet. The nail drops of course without any change of polarity of the sheet iron or the existence of any so-called neutral line."

Does not the writer know that when a nail is in contact with an induced magnet, or any other magnet, it has the same polarity, and is a part of the same? Now, as it clings to the iron, and both move together toward the magnet, why are we to suppose one changes its polarity without the other changing also? The fact is they both change. At the point where they change they are both neutral, and will not cling together, but above and below they are polarized, and will cling together; if it is not so, then I have discovered that opposite poles repel and like poles attract each other.

We cannot destroy old laws or old facts, but may we not discover new laws and new facts without "a feeling of utter contempt for scientific men," as the writer remarks on page 144? The law of gravitation was not discovered in a laboratory, nor was the power of steam, nor electricity. I believe the world expects our learned professors to teach us what has been discovered, and not that there is nothing more worth knowing; and I believe the discovery of a new law is of as much value to the world, if discovered by Franklin with his kite, Newton with an apple, Faraday with his magnets, iron filings, and paper, a lumberman with a ten-penny nail, as if discovered by a learned professor in his laboratory.

W. W. GARY.

Huntingdon, Pa., March 17, 1879.

[REMARKS.—None of the experiments here mentioned by Mr. Gary are new; there is no neutral line in any such sense as he asserts; what he above specially claims as his discovery is simply a very old, well known phenomenon imperfectly and erroneously alluded to in his italics.

Everybody will agree with what our correspondent says about laboratory discoveries, Newton and the apple, Franklin and the kite string; but it does not necessarily follow that Gary has discovered anything with a ten-penny nail. All he appears to have done is to revive a few time-honored experiments and trot out before the public an ancient perpetual motion delusion.]

MISS HOSMER'S MOTOR.

Miss Hosmer, who announced the discovery by herself of a magnetic perpetual motion machine before Mr. Gary, has found out by trial that the thing will not operate, and has abandoned the field. Her application for patent in England was given up after the provisional patent was obtained.

HEINRICH GEISSLER.

The world of science has lost a distinguished follower in Dr. Heinrich Geissler, who died at Bonn on the 24th of January. He was born in the village of Igelshieb, Germany, in the year 1814. Having early in life mastered the art of glass blowing, he, after many years of wandering, settled at length permanently at Bonn, finding here constant employment in the preparation of articles requisite for scientific research—a kind of work which had peculiar attractions for him. He was a master of his art, and in his hands the treatment of glass by the blowpipe attained a perfection that had been before unknown.

He planned and manufactured apparatus of the most delicate construction and of the greatest accuracy, and for the last thirty years there has been issuing from his workshop a constant succession of the most novel and ingenious devices for the furtherance of scientific discovery. He was the inventor, among other things, of the mercury air pump, the vaporimeter, the normal thermometer, and the normal aerometer. But the apparatus with which his name is most closely identified in the popular mind is that of the "tubes" which bear his name, and which were designed for the exhibition and study of the phenomena that accompany the discharges of electricity in various gases and vapors. One of the earliest investigations of Dr. Geissler was undertaken jointly with the celebrated physicist, Plücker, in 1852. They made, at this time, a series of observations on the expansion of water, and established the maximum of density at 3·8°; this was effected by means of a very delicate contrivance, in which the expansion of the water was exactly compensated by the introduction of mercury. In 1869 Geissler and Vogelsang together, having decomposed quartz and topaz by means of a galvanic current and collected the resulting gases in a vacuum, demonstrated the presence in the cavities of these minerals of liquid carbonic acid, the presence of the carbonic dioxide being shown in the vacuum by the electric arc. Not long after this Geissler succeeded in changing, by the action of the electric current, ordinary phosphorus into the amorphous state.

In very many respects the career of Dr. Geissler was similar to that of Ruhmkorff, whose death we chronicled a year ago. Both arose to positions of honor, and to a certain degree of fame, in the scientific world, from the lower walks of life; and both gave, by means of their familiarity with scientific facts and principles, and their constructive ability, an impulse to the march of original physical investigation.

In announcing his death to the Berlin Chemical Society, the President, Dr. Hoffmann, said that Dr. Geissler could be best described in the English words "a self-made man."

Mr. Barnum Calls for a New Invention.

To the Editor of the Scientific American:

Cannot all our boasted Yankee ingenuity devise a cheap means of rendering cotton and linen canvas waterproof? All of my show tents are made of "Methuen duck," and I am obliged at much expense to send it to France to get it waterproofed. Any person in this country who can accomplish the same thing effectually can make considerable money by it.

P. T. BARNUM.

Bridgeport, Ct., March 15, 1879.

Meat Canning by Machinery.

We are happy to be informed that the assertion of the *British Farmers' Gazette* (cited in our issue of February 22, page 116), to the effect that by means of newly invented machinery the meat canners of Melbourne could fill twenty-four cans in the same time that one is filled in Chicago, is not strictly true. At any rate, Melbourne is not that far ahead of St. Louis. A correspondent in the latter city writes that the St. Louis Beef Canning Co. can all their meats by machinery, and are confident that its process is not surpassed anywhere.