Being in Salt Lake City for a few days, I was invited to join a party of ladies and gentlemen who intended looking through the mines of Bingham Cañon. This gave me the opportunity of examining the Old Telegraph, with the foregoing results. At the present time the quantity of ore in sight is something over 2,000,000 tons in the open space.

I saw a body of ore with a face 300 feet long, 56 feet high, and over 100 feet thick. This was in the 310 foot level, in one spot only; and was nearly virgin ground. The temporary agent and manager who represents the French company has introduced many good reforms, such as putting in the waste and saving the timber, while his energy and zeal find indorsement on all hands. He proposes soon to introduce the system of contracts with the workmen which prevails in Europe. He has expressed himself as favoring high wages to good workmen, and this new system of paying by the piece will guarantee this result.

It may be said generally of the Old Telegraph Mine that the temperature is agreeable, the metal easy of access, and readily worked. There is no water in the mine; blasting is not necessary, nor hoisting. But the metal is run down shoots in the inside of the mine from the higher to the lowest level; and outside of the mine down the tramway and railway to the furnaces and concentrating works, being a continuous falling until the ore is changed into bullion.

H. S. W.

Salt Lake City, Utah, June 26, 1879.

CURIOUS DISCOVERIES IN REGARD TO THE MANNER OF MAKING FLINT IMPLEMENTS BY THE ABORIGINES AND PREHISTORIC INHABITANTS OF AMERICA.

At the last meeting of the Anthropological Society at the Smithsonian Institution, Mr. F. H. Cushing, who has made an original and experimental study of aboriginal processes in the manufacture of pottery, stone axes, and flint arrow heads, using only the tools which were within the reach of the aboriginal manufacturers, gave an interesting description of the manner in which flint implements, especially arrow and spear heads, were made by the prehistoric inhabitants of this country and Europe, previous to the discovery or introduction of iron.

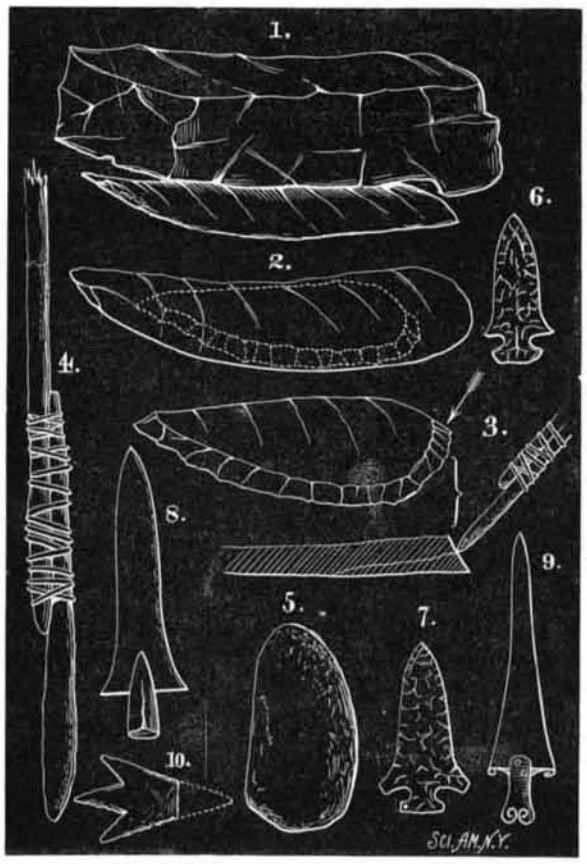
It is the popular impression that flint arrow heads were all chipped into shape by striking off fragments with a rude stone hammer, and this was the method first tried by Mr. Cushing. He found, however, that it was impossible to imitate in this way any of the finer and more delicate specimens of Indian arrows, and that three out of four even of the coarser forms were broken in the process of manufacture. It was evident, therefore, that the Indians had other and more delicate processes. After many unsuccessful experiments, he accidentally discovered that small fragments could be broken off from a piece of flint with much greater certainty and precision, by pressure with a pointed rod of bone or horn, than by blows with a hammer stone. The sharp edge of the flint would cut slightly into the bone, and when the latter was twisted suddenly upward a flake would fly off from the point where the pressure was applied in a direction which could be foreseen and controlled.

To this process Mr. Cushing gives the name of flaking to distinguish it from chipping produced by percussion. And its discovery removes most of the difficulties which previous experimenters had met with in trying to work flint without the use of iron. Spear and arrow heads could, in this way, be flaked even into the most delicate and apparently fragile shapes with a certainty attainable in no other way, and with a greatly lessened probability of breakage. Mr. Cushing then described with the aid of blackboard illustrations all the steps in the manufacture of an arrow, beginning with the striking off of a suitable flake from the mass of material selected, trimming it roughly with a pebble into a leaf shape with a beveled edge, Fig. 2, scaling off surface flakes by repeated blows with a hammer stone upon this edge at right angles to its plane, Fig. 3, and finally finishing, pointing, and notching the arrow head with the bone flaking instrument previously referred to.

Surface flaking, which is the thinning of the unfinished arrow by the detachment of flakes running from the edge to the center, is the most difficult part of the whole process. Arrows upon which no signs of it appear were always the work of beginners. It may be produced either by direct blows with a hammer stone, by pressure with a flaker, or by a combination of the two methods, the hammer being used with the flaker as if the latter were a stone chisel. Each of these methods leaves its unmistakable mark upon the finished implement, so that it is easy to determine by simple inspection of the chipped article to what degree of perfection the art had come at the time when it was made. Thus it can be proven that the marvelously chipped axes of the Danish shell heaps were produced by using a horn flaker as if it were a stone chisel, by striking it with a hammer stone, while the beautifully finished daggers, arrows, and spear heads from the same region had been flaked by a combination of the latter process and pressure, and that when the paleolithic flint implements found in the drift were made, the art of using the flaker in either of these methods had not yet been discovered. Hammer stones, however, which bear marks of having been used for chipping, are found everywhere where arrow or spear heads occur, showing that savages universally pursued the method followed by Mr. Cushing, of first blocking out the implement with a hammer stone, whether they afterward used a flaker to finish it more perfectly or not. Since, therefore, all the specimens found in the great "deposits," or *cachés*, throughout this country bear marks of the hammer stone, but not of any other instrument, they may be definitely regarded as unfinished articles laid by for future completion.

The various processes and implements used in chipping and flaking had grown out of the difference of material to be worked. Where the latter was tough, as was the case with the hornstone of Western Arctic America, it could not be flaked by pressure in the hand, but must be rested against some solid substance, and flaked by means of an instrument the handle of which fitted the palm like that of an umbrella, enabling the operator to exert a pressure against the substance to be chipped nearly equal to the weight of the body. Thus the T-shaped wooden-knife flaker of the Aztecs was the outgrowth of the easily worked obsidian; and the slender horn flakers of California and the Southwest, of the fragile chalcedony and jasper of that region.

Material often contained small masses of harder or tougher substance. Where these occurred the ordinary flaking was likely not to remove them, in which case they formed objectionable protuberances on the unfinished arrow point. When nearer one edge than the other, their removal was attempted by chipping into that edge, thus making the arrow head onesided. The almost invariable occurrence of traces of such protuberances on the edge most chipped of these unequal specimens was evidence that this, the so-called "knife type," was of accidental origin.



THE MAKING OF FLINT IMPLEMENTS.

1. Mass and flake; 2. Leaf form; 3. Surface flaking; 4. Flaker, upper end wood, lower end horn; 5. Chipper (pebble); 6. Bell-shaped Stone age spear; 7. Bell-shaped spear; 8. Bronze age spear; 9. Modified bell-shaped dagger, bronze; 10. Example of accidental chipping.

Most if not all of the so called "turtleback" implements which had been regarded by archæologists as designed for special purposes, were really articles never finished because of the presence of such prominences on the center of one side or the other.

Where these irregularities appeared on the middle of the side of a specimen of choice material, or on which much labor had been expended, its removal was undertaken by the chipping down of both edges, thus resulting in the bell-shaped outline of spear head, Fig. 6, so much admired by archæologists, which being recognized by savage manufacturers as ornamental, was afterward purposely produced, and even survived in the weapons of the bronze age, Fig. 8, or that period immediately following the age of Stone.

The difficulty of making long narrow surface flakes made it much easier to form narrow and delicate points than the larger, though even ruder forms on which much surface flaking was necessary, and the slender fragile perforators which had been regarded as inimitable by any existing race were really the most readily and rapidly made of all.

In flaking a large arrow or spear head in the hand it was necessary to hold it alternately by the point and by the base. As the grasp by the base was much firmer, the pressure was greater, and hence the flakes scaled off further toward or over the center, and as this unavoidably happened on opposite edges of the specimen, a twisted and even at times distinctly beveled point was the result when hard material was flaked. This not only accounted for the beveled type of spear head so common in Tennessee, but also indicated that wherever this type occurred the method of flaking was by pressure in the hand and not as among the Esquimau and Kjockkenmoedding people.

Mr. Cushing added that since all specimens of this kind were found to be twisted one way—from right to left—the inference was unavoidable that the aborigines who made them were, like ourselves, a right-handed people, and that wherever this form occurred the method of flaking by pressure in the hand must have prevailed.

Prof. Mason here mentioned that he had seen two examples beveled from left to right, indicating, of course, an occasional left-handed individual.

Mr. Cushing then explained how it could be known on examination whether an imperfect arrow had been broken during the process of manufacture or by use.

He then referred to an archæological publication recently (1868) printed in Spain, on the covers and title page of which appeared the figure of a three-pointed arrow. This had been regarded as one of the most important archæological discoveries of that year, and its figure adopted as the seal of the book. But had the members of that Spanish society and the author been practically familiar with flint chipping, they probably would not have regarded as so rare the inverted base of a common barbed and stemmed arrow head, from which the point had been removed by accidental chipping (Fig. 10).

Arrow flaking was accompanied by great fatigue and profuse perspiration. It had a prostrating effect upon the nervous system, which showed itself again in the directions of fracture, and it was noteworthy that, on an unimpressible substance like flint, even the moods and passions of centuries ago might be found thus traced and recorded.

Mr. Cushing then closed his remarks by calling attention to the use of the study and practice of the art of arrow making in establishing the groundlessness of all archæological classifications of chipped articles, based on diversity of form alone, or of attributing distinct or definite uses to types of form thus established, which these investigations proved to be the results only of constantly or imitated recurring accident.

Photography by the Electric Light in a French Court of Justice.

The question whether the Vander Weyde system of the application of the electric light to photography is or is not public property, is one which is just now forcibly occupying the attention of the photographic world in France. And there is much reason for this, for the question possesses more than one interesting aspect: There is, in the first place, the point of law as to what rights are attached to a patent taken out in France, and then there is the doubt as to the line of conduct to be pursued by photographers who desire to work the electric light in their own studios.

Naturally there was some excitement at the thought of the advantages which operators by the electric light would be able to possess, once it was completely established that by a new process really practical results could be obtained. It was remembered that the ill success of the first attempts to introduce the electric light into photographic work had caused them to be quickly abandoned, and that since then they had never been renewed. In the English Department of the late International Exhibition at Paris there were shown some photographs taken by the Vander Weyde system, and professional photographers were astonished, for all the artistic conditions which were formerly wanting were now combined in them. Thanks to the special organs of the press, in which the *Photographic News* was one of the most active in bringing before the public the merit of the invention, it was learned that the technical requirements had been satisfactorily complied with by the new process, and that the employment of the electric light in photographic operations would henceforth be feasible; arguments—or, rather, proofs—not to be refuted were forthcoming. Some time ago, it is true, photographs had been taken by the electric light; the fact that this peculiar manifestation of energy could be successfully substituted for daylight was well known. But the apparatus used only allowed a pencil of rays to be emitted in a confined space, and the result was not what in photographic language is called "clean work." The great problem to be solved was that of the diffusion of the light, and this was successfully accomplished by M. Vander Weyde. According to the *Times* of the 25th of December, 1877, in an article containing an account of this valuable invention, M. Vander Weyde took out his patent in England on the 1st of February of the same year.

In France the discovery was only honored from afar. People rejoiced at the idea that photographers would henceforward be independent of the changes of light, and would be able to work at any hour and during any kind of weather. There were, indeed, some who, before the Vander Weyde discovery, had rendered the assertion possible—and, indeed, even before electricity had been thought of at all for the purpose—placarded the startling absurdity, "*Dull weather is the best,*" in large brilliant letters illuminated by gas; but it was merely a means of advertisement, and gave occasion for many a laugh among professional photographers. Business men, whose time, during the hours of sunlight which were propitious to the operator, is fully occupied, were prohibited from even going to the photographer, however desirous they might be of having their portraits taken; ladies could not realize their wishes of being represented in evening dress unless they put it on in daylight; actors and actresses, whose costumes are intended to produce an effect by the illumination of the foot-lights only, were compelled, much against the grain, to endure their finery in the full glare of the sun. In France, then, we have been content to stand on our old lines, though we still tried to emulate the photographic feats of the electric light in England.

All the advantages of the process, however, much as the French photographers appreciated them, they could only hope to realize by the employment of an electrical apparatus giving a sufficiently diffused, and at the same time intense,

light to produce a photograph. This was well known, and yet the old misleading ways were followed. At length the patent right for France of the Vander Weyde system was bought by M. Liebert, who, of course, supposed that he had purchased also the right, not only of working the process for his own profit, but also of granting licenses to others to do so. He therefore inaugurated sittings for the press, and gave a splendid fête—a description of which appeared in the *Photographic News*—in order to give publicity to his new system, which certainly was deserving of all the honor that he showered upon it; in short he made as much noise as he possibly could, as is the case with every adventurous speculator or fashionable artist. But, on the other hand, M. Pierre Petit has done all this without having purchased anything. At the grand fête held on the 8th of June last, at the Paris Opera House, on behalf of the sufferers by the Szegedin inundations, M. Petit exhibited the whole process. It struck him that it would be an excellent occasion for killing several birds with one stone. He would give those who attended the fête the opportunity "*faire sa photographie à la l'électricité*," as says a curious song just now popular at the Alcazar; he would be largely aiding the charity; and he would be advertising the new process so as to benefit himself. But M. Liebert, who had bought the sole right of taking photographs by the Vander Weyde system in France, was not one to allow what he considered an infringement of that right. He therefore applied to the President of the proper tribunal, and having explained that M. Pierre Petit had not acquired the necessary license for working with an apparatus for producing the electric light, which was a mere copy of that of M. Vander Weyde, he obtained a legal injunction, and the services of an officer to watch and see that nothing was done by night or day in preclusion of the rights of M. Liebert. In consequence, the officer of the court, accompanied by a police officer, and carrying an officially-stamped slip of paper, presented himself at the Opera at the height of the fête. This *coup de theatre* in a place whose frequenters are accustomed to similar *contretemps* did not give rise to so much disturbance as might have been expected. Fortunately for the success of the philanthropic work, for whose benefit the operations had been undertaken, the operations were not interrupted, so that the charity was no loser.

Up to this point nothing extraordinary had taken place. All that had occurred was in regular order. The owner of the patent had obtained an injunction against a rival whom he had accused of infringing it. This may be seen every day, only, perhaps, not generally at a charitable fête in the Opera House. But the unexpected part of the affair came afterwards: M. Pierre Petit, in reply to his opponent, acknowledges that he operates with an electrical apparatus diffusing light by means of a converging pencil of rays, but he asserts that he has wronged no one, for, the system employed by him being public property in France, he had a perfect right to make use of it. For the very reason that he believed himself to have that right, he did not think it necessary to pay for it, as M. Liebert had done. In a word, he laughs at the English patents of M. Vander Weyde.

Now what will M. Vander Weyde do in this case? Will he be satisfied to be considered as having invented nothing? Will he submit to the imputation of having illegally accepted payment for licenses to work an invention the right to which up to the present no one has dared to deny him—an invention for which he had received the applause of all the world, and the honors and profits for which were thought to be legitimately his due? As may be seen, the question is a complicated and a difficult one. The courts of law are called upon to settle it, and their judgment—which, of course, will cause all rights legally acquired to be respected—is awaited with impatience.—*K. Versnaeyen, in Photographic News.*

ENGINEERING INVENTIONS.

A device for moving cars by hand, consisting of a lever having a hook for attachment to the axle and a dog pivoted to the lever and arranged so that it will engage the flange or rim of a car wheel, has been patented by Mr. William B. Newlon, of Fremont, Neb.

Mr. Stoddart Howell, of New Orleans, La., has invented an improved wharf for rivers, harbors, and lakes. It consists in the combination of metal straps with the mortised cross pieces and stringers of a wharf, and other novel features of construction, which render it possible to build wharfs of any desired length and size in a shop or inclosure and afterward to put them up very quickly.

An improvement in windmills has been patented by Mr. Francis M. Wilson, of Tekamah, Neb. It has an arrangement of an eccentric and double crank shaft, by which it is claimed a much larger percentage of power is realized than in the ordinary mills.

An improved press for baling cotton and other substances, patented by Mr. Innes T. McIntyre, of Carrollton, Miss., consists in the combination of two pivoted movable followers and two levers coupled together, and provided with tackling for moving them both in the same direction. This movement moves one of the followers up and the other down, so as to compress the bale which lies between them.

Mr. Daniel Palacios, of New York city, has invented an improved oscillating pump. The pump cylinder is connected at its lower end with a hollow rock shaft or pipe, which communicates with the pump valves. The piston rod is connected with a crank on the pump driving shaft.

Mr. George Corbett, of Petrolia, Pa., has devised an improvement in oil, gas, and salt well apparatus. The improvement relates mainly to the construction of the framework that supports the moving parts of the machinery, the object being to make the framework stronger and more convenient to erect and adjust.

Mr. Francis J. Wehner, of New Orleans, La., has invented an improved compressing apparatus, the object of which is to compress semi-fluid substances, or substances of a granular character, and especially for crushing slabs of ice and forcing the pieces into a solid mass.

An improvement in pumps, patented by Mr. Cornelius E. Drake, of Avoca, Iowa, consists of a cylinder having its edges recessed to receive the packing rings, the rings being arranged so that they are kept in contact with the inner surface of the cylinder by the pressure of the water.

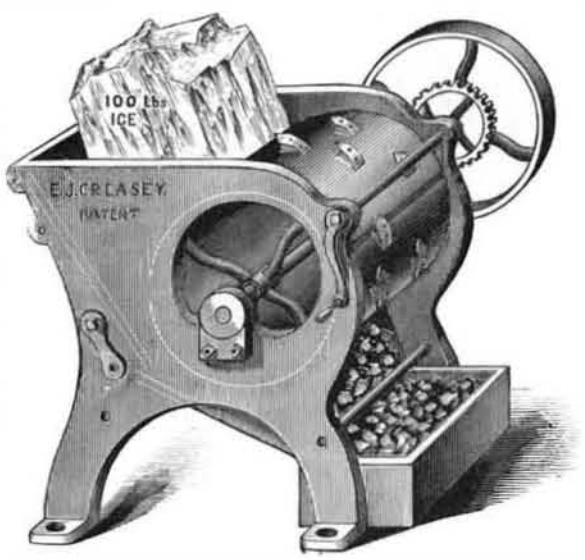
Mr. Samuel G. Munn, of Chicago, Ill., has patented an improved feed water heater, which consists of two water reservoirs connected by pipes running through a steam chamber insulated from the external air by a double shell or jacket. Pipes are provided for supplying and exhausting the water from the reservoir.

An improvement in steam packing rings has been patented by Mr. George C. Phillips, of Silver City, Nev. It consists in making segmental packing rings with recesses in their periphery, in which the water from the condensed steam collects and thus prevents them from over-heating or fusing under the heat of the steam.

Mr. William Redmond, of Greenville, S. C., has patented an improved rotary valve, consisting of two tubular valves fitted in concave seats at opposite ends of the steam chest, and communicating with the steam pipe through the side of the chest.

NEW ICE BREAKER.

The accompanying engraving represents a cheap and simple ice breaker, which picks the ice without breaking or crushing it. The size of the cut may be varied without stopping the machine. The machines are made in different sizes to suit different trades; the larger ones may be run by hand or power.



CREASEY'S ICE BREAKER.

The construction of the machine will be readily understood by reference to the engraving. The picks, which are of the best steel, are placed in a revolving cylinder or drum, and may be readily removed or replaced.

Further information may be obtained by addressing the Novelty Machine Works, 1608 S. Front street, below Tasker, Philadelphia, Pa.

Advantages of Fancy Farming.

The *Scientific Farmer* has a very sensible article on the advantages to a rural neighborhood, of having merchants and other well-to-do city people purchase homes in their midst. These people, says the writer, buy a suburban or more remote farm, bring to it of their wealth, remodel the old house or build anew, tear down or improve the old barns, and build from designs of a city architect who understands more of harmonies than uses, stock with improved breeds of cattle, the latest style of implements in endless variety, and the most expensive novelties from the seed stores, and spend, perhaps without hope, certainly without prospect, of adequate returns. Wherever fancy farms abound, there may be observed continuous improvement in their vicinity. They serve to change the habits of life of the farmer and his family. The old inconvenient methods of housekeeping give place to a more convenient system. The water from the well is brought to the house, instead of being fetched in a pail from the distant well or spring; the wood-pile is placed under a shed or into a compact pile, instead of being heaped in the door-yard; the surroundings to the buildings are "slicked up"; flowers appear, perhaps, in the door-yard; the cattle are better fed, the fences better repaired, new crops and new markets are sought, and expenditures are increased as the income grows larger and is derived from more varied sources. All this comes from the influence of the example of the finely but expensively maintained farm, whereon neither expense nor income is much considered, and which, judged from a business stand-point, must be considered a failure; judged from influences on others, is to be looked upon as a public benefaction.

There is too prevalent a feeling of jealousy towards the fancy farmer on the part of the actual farmer, and too little appreciation of the benefits which may be and are derived from his presence. It is to this leisure class of farmers that agriculture must look for that progress which results from unrest, abundance of means, and a strong enthusiasm towards a pursuit. This man can experiment, when the poorer man cannot afford to depart from the beaten rut until better results from a departure become demonstrated. This class encourage inventors and dealers by furnishing opportunities for the trial of new things which promise well, and when through costly failure an improvement is secured, the working farmer can secure the perfected article. This class import foreign cattle and test their adaptation to our needs. They introduce new fruits and improved vegetables, which, if found deserving, soon find distribution throughout the neighborhood. They extend a knowledge of the arts of culture, and tend to distribute a practical knowledge of hotbeds and forced crops; and in addition to these more obvious benefits, contribute largely, through taxation, to the public necessities, and relieve in this way the burdens on others.

How Typhoid Fever may be Propagated.

In a recent number of the *Popular Science Monthly*, Ely Van De Warker, M.D., of Syracuse, N. Y., under the title "Typhoid Fever Poison," reports seventeen cases of the fever in an isolated suburb of the city in which there were but fourteen houses. The first case was imported; thence through the overflowing of the privy in which all the excrement of the patient had been thrown, a well became contaminated. All the persons who were taken ill used this well. It was the constant or occasional source of supply of seven of the fourteen families. No cases occurred in the households who did not drink from this well. Some cases were developed in every family who drew water from it. The families who escaped were exposed to every other influence but that of this particular well; their own water supply was the same, less the privy contamination. It is not unlikely that their own wells received some of the overflow from their own vaults, but as these were free from typhoid poison, no ill results ensued.

About eight years since, Dr. Flint, who has studied and written a great deal on the subject, became satisfied that a source of typhoid fever existed which was little dreamed of, and which at first thought would seem impossible. This source, as he then enunciated it to his home medical society (and not to his knowledge having been before suggested), is found in *ice*. If this idea is thoroughly investigated, it will not appear to be very problematical. In the first place, the poison is not destroyed or impaired by freezing (some one long ago remarked that ice often masks or conceals what it does not kill). Now, whence comes our ice supply? Often from shallow reservoirs in the midst of neighborhoods of large towns purposely made to receive surface drainage from all around, under the erroneous idea that no harm will ensue, as freezing is supposed to purify and render harmless what might otherwise be objectionable. Great quantities of ice are taken from canals, from creeks, from stagnant ponds, and from streams that are either the natural or artificial recipients of surface drainage, of the outpourings of sewers, and of uncleanliness from various sources. The danger from ice taken from improper places is not only from that which is drunk, but from its use in refrigerators and preservatories, where milk, butter, fruits, vegetables, and meats are subjected to its saturating influence as it vaporizes. Several instances have fallen under the doctor's observation where the disease, by the most careful investigation, could not be traced to any other source; and if we accept as a fact the statement positively made by Budd in the London *Lancet*, in July, 1859, that it never originates *de novo*, but proceeds from a special and specific poison, which is capable of diffusion to a great extent, and which preserves its noxious qualities for a long period, even if buried for many months, we cannot reject the hypothesis of ice infection; and it is hoped that it will be made the subject of very thorough and careful investigation.

How Business is Now Done.

The old methods of doing business are fast passing away, and whether the change is for the better or not, those who wish to achieve success must abandon the old and fall into the new. A revolution has been wrought in such matters, and the old methods are daily becoming obsolete. One hundred thousand commercial agents or drummers are now employed to travel the length and breadth of the country in the interest of their employers, and in this fast age no one, unless he holds a monopoly of some good thing, can afford to wait for customers, so great is the competition in every line or branch of business. As pertinent to this subject, the Boston *Post* says: "The ways of traffic are not the old ways; wooden ships are going out of date, and sailing vessels are giving place to steam; currency is superseded by commercial credits; the cable and telegraph have brought markets close together; railroads derive their freight profits from the perfectness of their terminal facilities; men buy and sell by sample before products and manufactured stocks are moved; prices and rates change oftener now in a day than they used to do in a week or a month; everything tends to economy of business friction, to bringing things down to the finest point by the shortest way, to the performance of the most work by the least machinery."