readers of the SCIENTIFIC AMERICAN. They have the education, the energy, and force of character to produce the most substantial results; while, at the same time, there is no class who would reap more solid advantages from these institutions than they would. In such a library, maintained in a village of, we will say, not more than two thousand inhabitants, there would be provided, besides the books for circulation to be read at home, for the public reading room, the best encyclopedia of a general character at the outset, and gradually afterwards encyclopedias of specialties, of agriculture, civil engineering, and all the arts and the natural and physical sciences.

It must be acknowledged that though we have reason to suppose that all would echo their approbation of the project of a library to be maintained at the expense of the town, yet in each locality the impulse must be given and sustained by the activity of one or two earnest minds. Thus in Massachusetts, more than a third of the three hundred and forty-six towns have availed themselves of the powers and privileges of the public libraries law, also like the English of the year 1851. But Texas, which has also passed a law allowing towns to tax themselves for the like purpose, lacks the zealous citizens in each large town to make the law effective.

It is not known to more than a very small proportion of the voters of the State of New York, that for seven years past, since 1872, there has been a law on the statute book giving the towns and villages of the State the right to tax themselves to sustain a public library. We should be happy to obtain the name of any town where a public library has been founded and maintained under the provisions of that law. This result shows that merely to secure wise legislation is but a small part of the work which is necessary to be done to secure reading for adults as public and free as is the public school for children.

Men who are longing for libraries for their own towns may often find that existing laws give greater facilities for action than they have supposed. Let them seek for active co-operators among their fellow citizens; let them seek for donations and bequests, or the transfer of some library association to the town, that the new enterprise may start off on a broad and solid foundation.

FOREST CULTURE PAYS.

That in the long run it would pay to reclothe the waste and untillable lands of our country with forest trees, no one doubts. Future generations will need wood and timber, need it badly, we fear; and it will be doing the future good service to make provision for their wants now. No one doubts that; but very few care to labor for that end in the absence of more immediate remuneration, and very few are aware that it is not necessary to wait a hundred years for a timber crop to pay. The writer has not yet struck the downward slope of age, yet he has seen large areas of timber land cleared three times; and the second and third growths have yielded a larger body of wood than the original forest. This without specific cultivation.

With cultivation, Mr. Richard S. Fay, in Essex county, Massachusetts, has demonstrated that a forest crop will begin to pay expenses in a very few years, and in the course of ten years will bring in a handsome profit on the whole capital expended. Some thirty years ago Mr. Fay planted an untillable portion of his estate near Lynn with European larch and other forest trees. Up to a year ago the thinnings from this plantation, according to the Massachusetts *Ploughman*, yielded some seven hundred cords of firewood, besides a large amount of fencing material. Last winter the thinning produced:

175 cords of firewood, sold at an average of $5.50	$962.50
500 larch posts, 25 cents	125.00
51 larch telegraph poles, $1	51.00
100 larch railroad sleepers, 50 cents	50.00
	$1,188.50

The area planted is not given; it was, however, worthless for regular agricultural uses, and as the crop of last year is likely to be repeated from year to year, without diminishing the final crop, the investment is looked upon as fairly profitable. We are happy to believe that in many portions of the Eastern States the area of timber land is greater than existed twenty years ago. Still there are thousands of barren acres in almost every county, that would speedily become a source of profit, if the owners could be made to realize the advantage of planting trees, or of protecting the early natural growths from the depredations of sheep and cattle.

HARBOR OF REFUGE ON THE PACIFIC COAST.

There is a project before Congress to build a harbor of refuge somewhere between San Francisco and the Strait of Fuca. These points are over 700 miles apart, and yet between them there is not a single harbor that can be entered in a southerly gale. There are, it is true, many open anchorages scattered along the coast between these places, which afford reasonably good protection for vessels against the northwest winds and seas that prevail in summer, but there are none that a vessel can enter in heavy weather when the wind is south, southeast, or southwest, as it frequently is in the winter season. The want of such a harbor of refuge will be seen when we state that since January, 1861, no less than 427 disasters have occurred to the shipping on the Pacific coast north of San Francisco, whereby hundreds of lives and millions of dollars were lost, many of which might have been saved had there been a suitable harbor of refuge.

There are three convenient places where a harbor might be made, namely, Port Orford, Coos Bay, and Foulweather Cape. The first of these is just about half way between San Francisco and the Strait of Fuca; Foulweather Cape is 120 miles to the north; and Coos Bay between the two. Surveys have been made by government engineers of Port Orford and Foulweather Cape, but for some reason not explained Coos Bay has not been examined, or at least no report on it seems to have been made.

Port Orford appears, from its geographical position, to be the best place for the harbor. It is easily accessible, presents a deep and capacious roadstead, offering secure anchorage from gales from all points except south, southeast, and southwest; the land around is high and prominent and presents all the materials easily accessible for a stone breakwater. All that is now needed to make it a secure harbor of refuge at all seasons is a breakwater, behind which vessels can ride safely at anchor during gales from the south, southwest, and southeast.

The government engineer, Major Wilson, states that a breakwater 5,000 feet long would secure a harbor of about 300 acres, and would give ample protection to a large fleet during the heaviest gale. Such a breakwater is estimated to cost $9,405,000. It is thought, however, that for present purposes a shorter one could be built of about 2,000 feet, for $3,427,000, and this could be extended when necessary.

Cape Foulweather, the other place proposed, is a promontory whose crest line runs from east to west at right angles to the general line of the coast, making bays to the north and south. On the north the shore line is crescent shape, the outer extremity pointing north, a reef making out from it in a direction north-northeast a distance of about 5,000 feet, terminating at a lone rock about 1,800 feet from the beach. The depth on this reef varies from 10 to 30 feet, except for a distance of about 1,200 feet near the cape, over which there is a channel of that width and of a depth of from 30 to 40 feet. By building a breakwater from the extreme point of Cape Foulweather northward inside of the reef above described for a distance of 600 feet, a very good harbor would be secured. This would inclose an area of about 100 acres, under the lee of the cape, with good anchorage in from 4 to 8 fathoms of water. It is believed that this small breakwater could be built in that locality for about $670,000, and that the harbor would be sufficient for the present. If desired at any future time it could be enlarged by extending the breakwater along the reef. This harbor with the 600 feet of breakwater would, however, only be available in south and southwest gales, but during heavy weather from the northeast vessels could anchor on the other side of the cape.

Another plan proposes that a breakwater some 9,900 feet long shall be built on the south of Cape Foulweather, starting from Zaquima Head below the cape, running west, and then curving to the north. This would inclose about 1,000 acres, but its cost would be very large—over $11,000,000.

THE SOCIAL SCIENCE CONVENTION.

The annual meeting of the American Social Science Association was held in Boston, January 8. The meeting was opened by the reading of a letter from the president, David A. Wells, explaining his absence and reviewing the progress and opportunities of social science. Never before in the history of the world have so many and so important questions —fiscal, economic, educational, sanitary, and moral—pressed themselves upon the attention of the public.

The steamship, the railroad, and the telegraph are breaking down the old and formidable barriers of nationalities, and, for the purpose of business, are making the whole world one country, a condition of things under which the great fundamental truth of modern political economy, that nations and individuals are alike benefited and never injured by the prosperity of their neighbors, will be more than ever manifested. All methods of production and exchanging are also undergoing modification, with the certain result, which no legislation can prevent, even if it were desirable that it should, of economizing labor and material, and the cheapening of production. During, and in consequence of these changes, and for years yet to come, there will be much of discomfort, and undoubtedly also of suffering, from the displacement of individuals from occupation and their readjustment in new positions or locations. Millions of capital now useful and returning an income to their possessors, are certain, in the no distant future, to be also made worthless, as the course of improvement requires that they shall be, in order that protection may be cheapened and made better. But the ultimate result will be undoubtedly greater abundance, less poverty, and a higher elevation of the race. To forecast the course of economic agencies and events; to help make the burden of disturbance and change in occupation less grievous to the people; to help overcome that moral inertia among the masses which greatly prevents them from helping themselves, and accommodating themselves with rapidity to the demands of progress, are all questions and problems preeminently within the domain of social science.

And if there is any advantage in associated efforts over individual and isolated effort, in the way of determining and disseminating truth, then, Mr. Wells concluded, the American Social Science Association has the largest of opportunities before it for future benefaction.

Perhaps the most remarkable paper read before the association was that of Mr. George T. Angell, of Boston, on "Public Health Associations in Cities," and it was remarkable chiefly as a tissue of extravagant assertions with regard to the adulteration of foods, drinks, medicines, and so on. The single fact that men do eat and drink and live is proof that matters cannot be anywhere near so bad as Mr. Angell asserts. He says in one place:

"Several mills in New England, and probably many elsewhere, are now engaged in grinding white stone into powder for purposes of adulteration. At some of these mills they grind three grades—soda grade, sugar grade, and flour grade. I am told that thousands of tons of it have been ground in one town of Massachusetts. It sells for about half a cent a pound."

Statements like this would have had some weight if Mr. Angell had merely taken the trouble to procure some of the ground stone for exhibition, with samples of soda, sugar, and flour containing it. How does Mr. Angell know that the thousands of tons of ground stone furnished by his single Massachusetts town are not used for perfectly legitimate purposes?

Again, with regard to milk, Mr. Angell says: "It is not water alone that is mixed with milk. Thousands of gallons, and probably hundreds of thousands, are sold in our cities which have passed through large tins, or vats, in which it has been mixed with various substances. Receipts for the mixture can be bought by new milkmen from old, on payment of the required sum. I am assured, upon what I believe to be reliable authority, that thousands of gallons of so-called milk have been, and probably are, sold in this city which do not contain one drop of the genuine article."

Our knowledge of Boston milk is but the slightest. It may be very grievously adulterated; but a single pint of imitation milk containing "not one drop of the genuine article" would have been worth more as evidence of adulteration than twenty columns of Mr. Angell's unsupported assertion. On such points social science demands facts, not what any man simply believes. Again, Mr. Angell says: "A large portion of our California wines are made in Boston cellars." Mr. Angell ought to have been able to furnish a shadow of evidence of such an extensive industry—if it had any real existence.

If the Social Science Association desires to secure or sustain a reputation for scientific spirit and character, it should insist that the honor of American industry shall not be thus ruthlessly assailed at its conventions, without abundant proof that the speaker knows what he is talking about, and is not given to reckless exaggerations. It should not allow its meetings to be made the spouting place of sensationalists and fanatics. Personally Mr. Angell may be all that his name implies; we have no knowledge of him whatever; yet we do not hesitate to say that he has grievously overstated his case. The cause of honest dealing is not advanced by such wholesale charges of criminal misdoing on the part of traders generally. That more efficient means should be adopted throughout the country for detecting and punishing adulterations, we are ready to admit; nevertheless we are persuaded that it is easily possible to furnish our tables with pure and wholesome meat and bread and wine—even with pure coffee, and pickles without copper—in spite of Mr. Angell's assertions.

SETTLEMENT OF A DOUBTFUL GEOLOGICAL POINT.

The use of the term "Hudson River Group," proposed by the New York geologists to designate the upper two members of the Lower Silurian system—the Utica and Hudson river shales—has long been a debatable point among other geologists. This term was rejected some years ago by Messrs. Meek and Worthen, on the ground that these rocks did not reach the Hudson river, and hence it was a misnomer. They proposed the substitution of the term "Cincinnati Group," on the supposition that the Lower Silurian limestones were the equivalents of the so-called Hudson river rocks of New York. This change was accepted by Professor Dana and other geologists, and thereafter in the current classification of the Lower Silurian the upper members were called the "Cincinnati Group."

Subsequently, however, Professor James Hale and Sir William Logan made an examination of the Hudson river region, which led to a clear recognition of the slates and sandstones of the Hudson river group on both sides of the river, as originally designated and limited in signification by the New York geologists, and constituting by itself the entire mass of the formation. On the west side of the river they traced the formation as far as Kingston, and on the east side as far south as Rhinebeck, which they supposed to be its eastern limit. In the geological map drawn by these gentlemen and appended to the report of the Canadian Geological Survey, the rocks on both sides of the river, from Rondout on the west and from Rhinebeck on the east, extending southward, are designated as Calciferous and Levis. In regard to the latter rocks, Dana observes, in his Manual of Geology, that as they have afforded no fossils, their age is still doubtful. We learn now, however, from the Proceedings of the Poughkeepsie Society of Natural Science, that this doubt has been set at rest. Professor T. N. Dale, in a paper read before that society December 4th, stated that he had detected an abundance of fossils—brachiopods, univalves, crinoids, and fucoids—in both the rocks around Poughkeepsie and in those on the opposite side of the river. These Professor Hale identified as peculiar to the Hudson river group. This would seem to settle the fact that the New York State geologists were correct in their first determination of this formation. A statement of Professor Dale's discoveries also appears in the *American Journal of Science and Art*, for January, 1879.

Train the Boys for Business.

There is one element in the home instruction of boys to which, says a Boston paper, too little attention has been given, and that is the cultivation of habits of punctuality, system, order, and responsibility. In too many households boys from twelve to seventeen years are too much administered to by loving mothers or other female members of the family. Boys' lives during those years are the halcyon days of their existence. Up in the morning just in season for break ast; nothing to do but to start off early enough not to be late; looking upon an errand as taking so much time and memory away from enjoyment; little thought of personal appearance except when reminded by mother to "spruce up" a little; finding his wardrobe always where mother puts it—in fact, having nothing to do but enjoy himself.

Thus his life goes on until school ends. Then he is ready for business. He goes into an office where everything is system, order, precision. He is expected to keep things neat and orderly, sometimes kindle fires, file letters, do errands—in short, become a part of a nicely regulated machine, where everything moves in systematic grooves, and each one is responsible for correctness in his department, and where, in place of ministers to his comfort, he finds task masters, more or less lenient, to be sure, and everything in marked contrast to his previous life.

In many instances the change is too great. Errors become numerous; blunders, overlooked at first, get to be a matter of serious moment; then patience is overtasked, and the boy is told his services are no longer wanted. This is his first blow, and sometimes he never rallies from it. Then comes the surprise to the parents, who too often never know the real cause, nor where they have failed in the training of their children.

What is wanted is for every boy to have something special to do; to have some duty at a definite hour, and to learn to watch for that time to come; to be answerable for a certain portion of the routine of the household; to be trained to anticipate the time when he may enter the ranks of business, and be fortified with habits of energy, accuracy, and application, often of more importance than superficial book learning.

The Emery Mines of Chester Co., Pa.

In his communication, printed in our issue of November 2, W. J. L. spoke of the emery mines near Unionville, Chester Co., Pa., as having been abandoned for lack of mineral of marketable purity. Mr. Isaac J. Conner writes that the mines in question "have never been abandoned, only at short intervals, for the last nine or ten years," and that there are at present three different parties actually engaged in mining the mineral in that locality. The purity of the emery of Chester Co., Pa., is, he claims, unsurpassed. It was there, on the premises of Messrs. Chandler & Ball, four or five years ago, that the largest and best mass of emery ever found on the continent was discovered—a solid block weighing about two hundred tons.

A NEW SQUARING SHEAR.

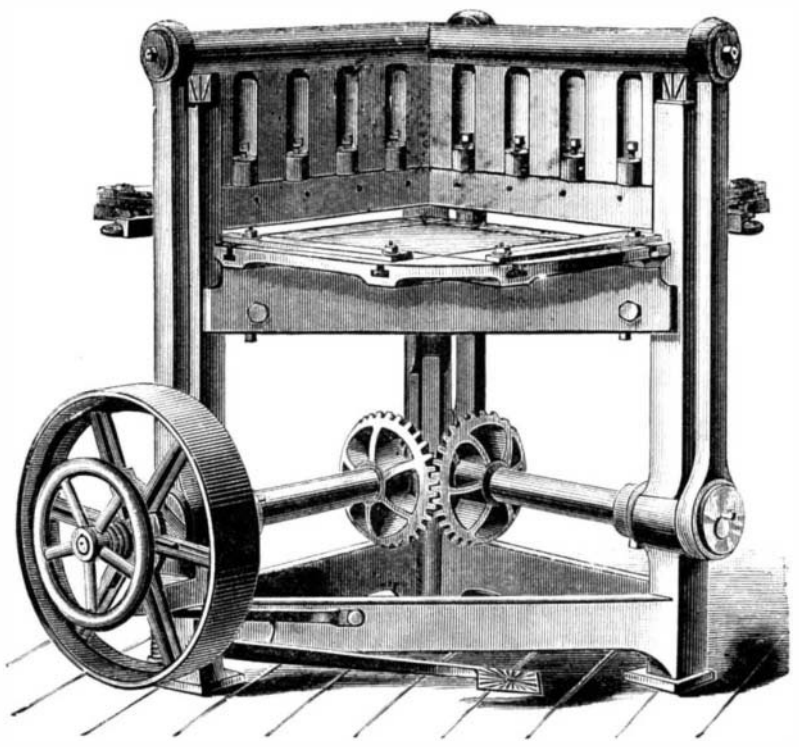
The operation of squaring a sheet of metal when performed by means of ordinary shears requires four movements of the sheet and a careful adjustment of the metal to the gauges. The accompanying engraving represents the new power shear manufactured by the Stiles & Parker Press Company, of Middletown, Conn., by which this operation is facilitated and rendered accurate.

This shear has two blades, each 22 inches long, set at right angles one with the other, and moving in unison, so that a sheet of tin can, with one motion, be squared on two sides, or the whole sheet squared in two motions. As will be seen by the engraving, there are suitable front gauges as well as independent back gauges, one for each blade.

The gauge on one blade can be set to cut a different width from the other, so that a part of a sheet of metal can be cut up into a certain width for one article, and the remainder into a different width for another article, resulting in the saving of stock.

The frame that holds the upper blades is carried down uniformly, by three pitmans, located one at the extreme end of each blade, thus securing a perfectly smooth cut.

The shear has the patent gib arrangement which this firm have applied to their presses. It is also provided with an automatic stop motion which leaves the blades wide open.



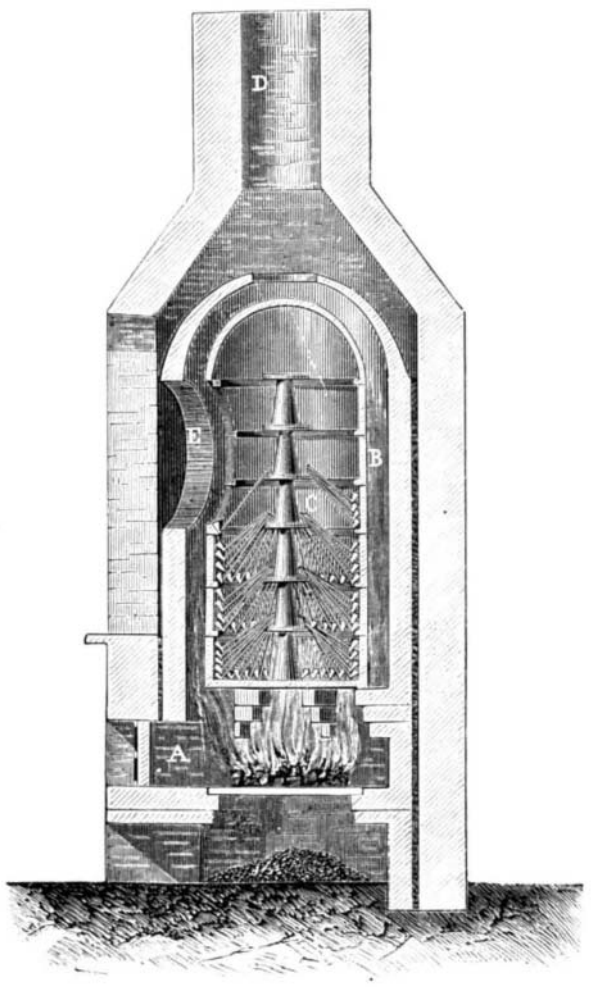
STILES' NEW POWER SQUARING SHEAR.

Quicklime a Wood Preservative.

The *Builder* states that M. Lostal, a French railway contractor, recommends quicklime as a preservative for timber. He puts the sleepers into pits, and covers them with quicklime, which is slowly slaked with water. Timber for mines must be left for eight days before it is completely impregnated. It becomes extremely hard and tough, and is said never to rot. Beech wood, prepared in the same manner, has been used in several ironworks for hammers and other tools, and is reputed to be as hard as iron, without the loss of the elasticity peculiar to it. According to the *Kurze Berichte*, lime slaked in a solution of chloride of calcium is used at Strasburg as a fireproof and weatherproof coating for wood.

CLAY PIPES AND THEIR MANUFACTURE.

Tobacco and the pipe are articles the habitual use of which has become general all over the globe, in imitation of the former inhabitants of America. Among the branches of industry which have been a consequence of the introduction of tobacco, the manufacture of pipes has become of considerable importance. Immense quantities of wood,



PIPE-MAKER'S OVEN.

meerschaum, china clay, and pipe clay are annually converted into pipes, principally in England, France, Germany, and Austria; a smaller quantity being produced in Holland and Turkey. Wooden, china, and meerschaum pipes are made mostly in Germany and Austria, and among clay pipe producers England takes the first rank. Although the value of clay pipes is comparatively small, the enormous quantity in which they are made makes them an important product of industry to England.

The principal pipe factories are located in Dorsetshire and Devonshire, where a pure variety of potter's clay is found in great abundance. It resembles kaolin in its character, although it contains a little less silica, and remains quite porous after baking. The clay is first freed of all impurities by levigation, and then undergoes repeatedly a process of kneading and curing in open tanks, exposed to the air, in much the same way as clay for other purposes is treated. After it has acquired the desired plasticity, it is divided into masses of about 50 lbs. each, which are then given to the formers.

The first step in making a pipe is the formation of the stem in a metal mould. A small lump of clay is left attached to the rod, of which the cup is afterward formed. The rod is then pierced throughout its length with an oiled brass rod. Holding the pipe by the free end of the stem, the operator now imparts to the cup its external form by means of a copper mould, in which if ornamental pipes are to be made are engraved the designs. It is provided with a spring to open it automatically. The pipe then passes to a third operator, who forms the inside of the cup with his fingers and establishes communication between the cup and the stem by piercing the separating wall with the brass rod. The pipe is now put aside to dry in the sun, after which it is ready for the oven. Three men finish from 600 to 700 pipes a day.

The accompanying engraving represents an oven used by English pipemakers. The fire, A, is located centrally in the oven. The heated gases circulate through the space, B, formed by the walls of the oven and by the muffle, C, which receives the pipes. The latter are introduced through the door, E, and arranged in the position indicated by the engraving, on shelves made of biscuit. An oven of this kind usually contains 2,000 pipes. The pipes are generally baked for eight or nine hours.

Ordinary pipes receive no glazing of any kind, while some of the better class are painted and glazed. They are very porous, hence their tendency to adhere to the lips. To overcome this the mouth ends are dipped in water containing a little pipe clay in suspension, and polished. By this means the pores of the clay are stopped. Pipes of better quality are covered with a mixture of soap, wax, and gum, and then polished.

Difficulty is occasionally experienced in holding the pipes in proper position in the oven. Some manufacturers fill the oven with fine sand after the pipes are in position. The sand fills all interstices and supports the pipes.

Several millions of dollars' worth of clay pipes are annually manufactured in England

Fortifying the Sub-Treasury.

The great amount of bullion which is concentrated at the Sub-Treasury, in this city, has suggested to the officials the desirability of strengthening the vaults, and taking other means of protecting the vast treasures within the building. To this end Mr. George L. Damon, of Boston, has been selected by Secretary Sherman to do the job.

The improvements will consist of steel gratings, iron bars to the windows of the three floors, wrought iron doors with loopholes, and three steel turrets similarly perforated to be placed on the roof. The center turret is to be octagonal in shape, and will occupy a commanding position in order to enable marksmen to sweep the roofs and the streets below in case of an attack by an armed mob. It is also understood that the Assay Office will be similarly protected, and in addition will be supplied with a Gatling gun. These precautions were first suggested at the time of the great railroad strike two years ago.

Machinery for the Manufacture of Toys.

Toy making by hand cannot bear high wages for labor nor high prices for wood. Hence the most important centers of the toy industry were established on the high mountains of Germany and Switzerland, where forests abound and the population were willing to work long hours for small pay. What can be done in the way of cheap production is illustrated at Leiffen, in Saxony, in a manner almost terrible. For making 180 toy kitchen utensils, as they are usually furnished to this country, *three* cents are paid. Sixty small boxes for packing these toys are paid for with from ten to fifteen cents. The making of wooden toys is almost the sole industry in many parts of central Europe, and the united labor of all, from the grandchild to the grandfather, formerly sufficed to obtain for the toiling families only a bare subsistence.

Here, one would think, if anywhere, the introduction of machinery would prove disastrous to hand labor. With the machinery now employed one man, working one machine ten hours a day, can turn out an amount of work which was formerly accomplished by a whole family working from eighteen to twenty hours a day for several weeks; and during recent years such machinery has been widely and rapidly introduced in the toy-making regions.

What has happened? The starvation of the poor hand-worker? That ought to be the result, if the socialist's objections to machinery were true; but such is not the result. On the contrary, the condition of the toy makers has been directly improved by the influence of machinery. In this way: The cost of toys, small as it used to be, has been enormously reduced, and the market for toys correspondingly widened. And though machinery now does the larger part of the work, the amount of work to be done has been so increased that the demand for handwork, in putting the parts of the toys together and the like, has been largely augmented. The result is the employment, at fair wages, of all the population, including aged people, cripples, and children, who otherwise would have nothing to do. Besides, the multiplication of factories has brought the scattered peasants together, schools have