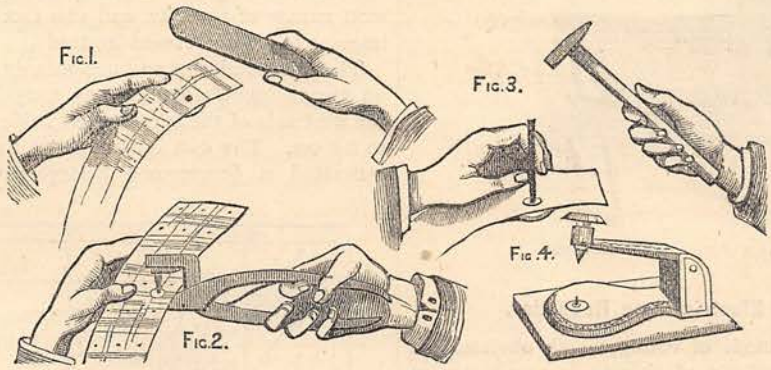
THE GATHERER.

Chinese Diamonds.

In the district of Shantung, in China, a new source of wealth has been discovered. Small diamonds exist in considerable quantities, and the mode of collection is very curious. The mountain streams of Chinkangling are the favourite spots for diamond-fishing. The natives walk about in the sand, and in the streams, arrayed in thick straw shoes. The diamonds, being obligingly ragged and pointed, stick in the straw shoes, which are burnt, and the diamonds are then collected from the ashes. The average size of these gems is about that of a pin's head, though one as large as a pea was carried to Cheefoo and sold to a mandarin lately. The trade is in the hands of the priests of the Chinkangling temples, and the diamonds are sold to glaziers at the great annual fairs.

Recent Discoveries in Molecular Physics.

Scientific men throughout Europe have just been excited beyond measure by announcements made by two of our chief physicists, Mr. Norman Lockyer and Dr. Crookes. Both have communicated their startling theories to the Royal Society, and we can in some measure explain them both together. Mr. Norman Lockyer has long been engaged in examining the light emanating both from the body of the sun and its exterior luminous atmosphere. Lines showing the presence of bodies with which we are at present un-

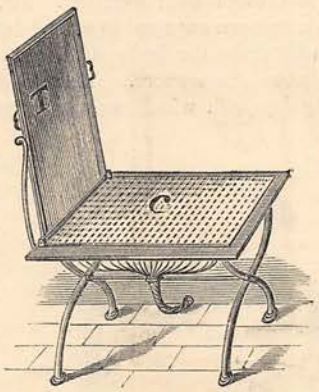


Buttons without Sewing.

These buttons are designed to dispense with the needle in the fixing of all kinds of buttons to the cloth, from the broad overcoat-button to the delicate pearl shirt-button. They are really permanent studs, which are inserted through the cloth, and fixed in their position mechanically. Each button consists of two parts—an ornamental face or top, and a stud which forms the stem and bottom part of the button. To fix the buttons into the cloth, which may be done by any one, the material is first pierced where the button is to stand, and then the stud is inserted from behind. The face of the button has then to be set on the stem of the stud, and the latter pressed home. This can be done in the case of cloth-covered buttons by simply turning the button on its face and striking the stud gently, as in Fig. 1. In the case of buttons with a central hole through the face, a pair of pliers is employed to crush the stem in the hole, so as to rivet the two parts of the button together, as in Fig. 2; but this can also be done by a hammer and punch, as in Fig. 3. For putting on linen and pearl buttons, a small press something like a letter-stamper is used, as in Fig. 4. Such pliers, punches, and presses are supplied along with the buttons. These buttons take a firm grip of the cloth, a grip which seems invincible, and they cannot fail to be especially useful to the sportsman and the emigrant.

acquainted, are exhibited by that wonderful instrument the spectroscope, and there can be little doubt that the heat and pressure which exist on the sun, obtain an intensity of which we can literally form no conception, and which we are utterly unable to imitate by any experiment. Philosophical chemists have for some time been gradually drifting towards the idea that the so-called "elementary bodies," such as iron, lime, lead, zinc, &c., may differ from each other only dynamically —that is, in so far as they are affected by forces. And Mr. Norman Lockyer now announces his belief that these "elementary bodies" are in fact compounds or unions, and that with heat or force enough at our command, such as may exist in the sun, they could actually be decomposed. Dr. Crookes' experiments are more decided, and may be said to amount almost to a demonstration of the truth of his views. All philosophers have long been agreed, and nobody has thought of doubting the truth of it, that matter can only exist in three states—the solid, the liquid, and the gaseous; but Dr. Crookes has proved that matter can assume a *fourth*, or ultra-gaseous condition. Under conditions of intense rarifaction, but agitated by an electrical current, gases of all kinds are so far

changed in every character as to constitute a fourth state of matter. The agitated molecules are no longer clashing against each other, but have longer paths and fewer collisions, and thus "the molecule is allowed to obey its own motions or laws without interference." The properties which constitute gaseity are reduced to a minimum, and the matter becomes exalted to an ultra-gaseous state. Dr. Crookes' conclusions are that "the phenomena in these exhausted tubes reveal to physical science a new world—a world where matter exists in a fourth state, where the corpuscular theory of light holds good, and where light does not always move in a straight line; but where we can never enter, and in which we must be content to observe and experiment from the outside."



CLERAC'S ELECTRIC VOTE RECORDER.

Clerac's Electric Vote Recorder.

This ingenious mode of voting, which obviates the present clumsy methods of division, is now in use in the French Assembly. By it the vote of every member is recorded on paper as it is made, a result which is effected by means of what is known as electro-chemical telegraphy. The vote recorder, as shown in the figure, consists of a printing tablet, C, on which are set small metal blocks of type, each block bearing the name or number of the member. There are two of these blocks to each member, one for his "Aye" and the other for his "No," as the case may be. The "Aye" block is of iron, the "No" one is of copper. Covered wires connect these two blocks to a small voltaic battery in the desk of the member, and the latter can at will send an electric current from this battery to one or other of the blocks. A sheet of bibulous paper, moistened with a solution of ferrocyanide of potassium, is laid over the printing tablet, and the lid T, which is simply a zinc plate, is folded over the paper. The voting then begins. If a member wishes to vote "Aye," he presses a button on his desk, which sends a current from his battery to the *iron* type block bearing his name. The currrent passes from the block, through the paper, to the zinc cover, and back to the battery, but in passing through the paper it causes the iron type to print the member's name in *blue* characters. Similarly, if he votes "No," he sends his current to the brass type, and a *red* impression of his name is the result. In this way, without having to leave his seat, each member in the House gives his vote, and the voting can be readily analysed by the scrutators who examine the printed record.

Pâte de Bois.

Wood-paste is the name given to a novel material exhibited at the recent Paris Exhibition by no less than seventeen Norwegian makers. It is simply pine-wood pulp moulded by pressure into card-board, thin sheets, cornices, panels, and other useful articles. This new industry promises to form an important export for Norway, the shipment of pâte de bois for France and Italy being already considerable.

Lake Nicaragua.

A passage has at last been made up the river San Juan into Lake Nicaragua. From Greytown at the mouth of the San Juan communication has been opened direct, by steamer, with Grenada at the north-west corner of the lake, and this fact will give great impetus to Central American trade.

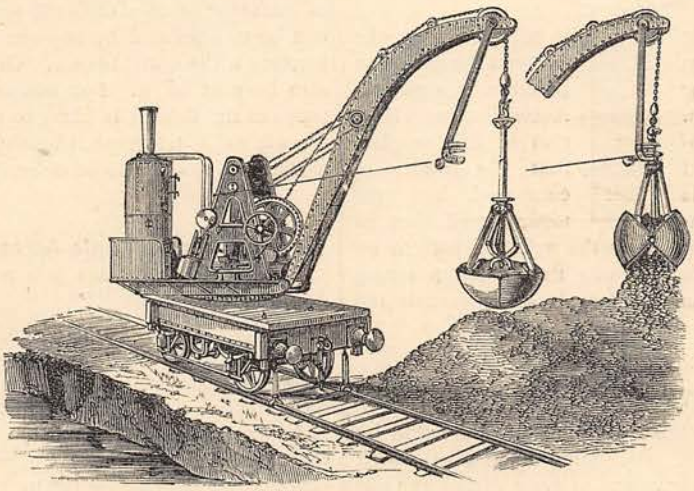
The construction of an inter-oceanic canal is now by no means improbable, as only sixty-four miles from the west side of the lake to the Pacific Ocean remains to be cut. The cost of this canal has already been estimated at £20,000,000, a large sum certainly, but

there can be little doubt of the great benefits that will accrue to the trade of Greytown and other places in Central and South America, if it be constructed.

A Useful Steam-Crane.

The huge steam-crane shown on the next page was exhibited and did much useful service at the Paris Exhibition. In clearing out the Machinery Hall the crane, after securing for its owners the Cross of the Legion of Honour in addition to jury awards of the highest class, dragged four large locomotives on to the

rails for conveyance from the building. It is described as a steam travelling derrick-crane with Fairbairn jib, all the motions of raising, lowering, altering the radius, slewing, and travelling being performed by steam. The crane is fixed on an iron-bound railway carriage. To alter the radius the jib can be lowered and raised by means of a drum at the apex of the A frame, driven by a worm wheel which is worked by a worm on an inclined shaft. A bevel pinion on the lower end of this shaft is worked by a bevel wheel, loose on the main shaft and capable of being thrown into gear by a clutch. This drum winds up a pair of chains, anchored to the crosshead and passing over pulleys, one on each side of the jib. This improvement in the circular rack alone would command a good name for the crane. In connection with this useful machine there is an expanding ballast skip in three equal segments of globular form made of steel plate, each segment converging at the apex, forming a sharp edge, so that when the skip descends it buries itself in the material to be removed, and on the movement of the machinery is closed up, hoisted, and conveyed to its destination.



THE NEW STEAM CRANE.

A Substitute for Earthenware.

A new kind of crockery, designed to fill the place of earthenware to some extent, has recently been introduced. It consists of cotton pulp or felt, glazed with a composition into which melted glass largely enters. It is a durable, elastic material, possessing neither the great weight nor brittleness of earthenware, but it has yet to undergo the test of general use.

A New Use for Old Fruit-Cans.

Preserved fruits of various sorts have acquired considerable popularity, and in families where the consumption of these articles is great, there would be a rapid accumulation of cans, were it not that these receptacles are probably summarily consigned to the dust-bin. They might, however, be put to a better use, by being turned to account in gardening operations. Let the can be pierced with one or more pin-holes, and then placed in the ground near the roots of, say, strawberry or other plants. The can is next to be filled with water, and, as the pin-holes must be so minute that the fluid can escape only with extreme slowness, it will "irrigate" a plant for several days. As soon as the tin is empty it ought, of course, to be refilled. It is said that this plan of watering plants has been tried with great success, resulting in a bountiful yield during protracted droughts.

Electricity and the Loom.

Several different kinds of "stop-motions" have been applied to looms for the purpose of stopping their action automatically when from some accident, such as the breaking of a yarn, they begin to work improperly. These purely mechanical contrivances are all more or less delicate, but an electrical stop-motion, not open to this objection, has been invented and applied to the cotton machinery of a Lancashire manufactory. The electric current used is generated by a small magneto-electric machine, weighing a few pounds, and driven by a strap from the main shaft. The apparatus is so contrived that the breaking of a yarn of the web closes the electric circuit, and the current then traverses the coils of an electro-magnet, which attracts a piece of soft iron so as to arrest the motion of a ratchet-wheel and make the driving-strap of the loom work loose on its pulley. The loom therefore comes to rest. This invention is applied to the carding-engine, the drawing-frame, and roving-frame, and it is proving a great boon to the cotton-spinners of Lancashire. We hear that a somewhat similar arrangement has been adopted in America for stopping the bobbins when a fibre breaks in reeling silk from the cocoon.

An Anti-Moth Paper.

This paper, which has been patented in the United States, is designed to protect cloths, furs, and carpets from mildew, moths, and other destructive insects. It is made from wool and cotton rags and Manilla hemp, and is saturated with a mixture of naphtha oil, carbolic acid, coal-tar, and petroleum, then dried by heating; after which it is cooled, and cut into squares for use.

The Magic Mirror of Japan.

The magic mirror is an honoured object in every Japanese household. It is of mythologic origin, and symbolises the "soul of woman" as the sword symbolises the "soul of man." It consists of a circular plate of bronze, from three to twelve inches in diameter, polished on the face with mercury amalgam, and

stamped on the back with a pictorial design and motto in relief. On looking into the face of the mirror no signs of this pattern on the back can be

seen, but when light is reflected from the face of the mirror on a screen, the design on the back of the latter becomes strangely visible on the screen. According to Prof. Ayrton, the explanation of this magical effect lies in the fact that the bronze of which the mirror is composed has the property of so contorting itself that its face is really misshapen by the relieved pattern on the back, and in such a way that, when a strong light is reflected from the face, it dimly reveals the pattern to view.

The Telegraphic Pen.

A great deal of interest was excited in the world by the invention of the articulating telephone, which enables us to waft our voices to great distances; and the most recent electrical marvel, the telegraphic pen of Mr. E. A. Cowper, the well-known engineer, which enables us to take up the pen and write a letter at a distance, just as if the writing-arm were lengthened out, is in a certain sense supplementary to the telephone. Words are fleeting things, and leave no record on the air behind them (although, of course, if sufficiently forcible they might on a delicate phonograph), and a telegraph which leaves a written document in the receiver's hands is a valuable addition to our means of communication.

With Cowper's Telegraphic Pen the writer grasps a pencil, writes his message, and has the satisfaction of knowing that as he writes at the sending station, so is he writing simultaneously at the receiving station.

The principle which has guided Mr. Cowper to his invention is, that any point in a curved line may be laid down on paper by reference to two fixed lines at right angles to each other, say the sides of the paper. It is on this principle that the course of a ship is laid down on a chart by means of latitudes and longitudes. In writing, then, the position of the point of the pen may at any moment be determined by its perpendicular distance from the edges of the paper, up and down, or right and left. Now, Mr. Cowper saw that if he could transmit these up-and-down and sidelong motions by telegraph, so as to combine them on a pencil or pen at the distant end of the wire, he would be able to make that pen reproduce the original writing. Writing, moreover, being a continuous act, and the point of the pen always changing its place, the process of telegraphing the ever-varying components of the motion would also require to be a continuous one.

A separate wire or telegraphic circuit is employed to transmit each of the two kinds of motion—that is, one is used to transmit the up-and-down change of position of the writing-pencil, and another to transmit the sidelong movement. These two independent motions are then combined on the writing-pencil at the other end, and a duplicate copy of the writ is the result.

Cowper's Telegraphic Pen can reproduce the writing of the same or of a different size to the original. It can be manipulated by any one who can write, and it receives without attendance. Of course, drawings can also be sent by it. For business and military purposes in the field, it is likely to be very useful; and as a confidential telegraph, whereby private signs can be exchanged, it will also be of service.

Answer to Triple Acrostic on p. 255.

A t L a S
U nm A nl Y
L i N e N
D ili G enc E

The Telectroscope.

A very curious apparatus, which is designed to reproduce telegraphically images from the camera obscura, has been submitted by M. Tenlecq of Ardres. The apparatus consists of an ordinary camera obscura, with an unpolished glass at the focus, and a telegraphic transmitter. The tracing point of this transmitter is a piece of selenium, enclosed by a pair of spring pincers, insulated and connected with the pile and line respectively. The point forms the circuit, and will communicate vibrations of light as it moves over the glass, which can be more or less illuminated at pleasure. The receiver will also be a pencil vibrating before an electro-magnet governed by the electric current emitted. This pencil will also be connected with a thin iron plate, and will support a sheet of paper. Now, when the paper receives the images produced in the camera, the pencil will transmit to the sheet the vibrations of the iron plate, more or less. If the selenium point of the transmitter be run across an illuminated surface, the current will increase, the magnet will attract the plate, and consequently will draw the pencil away from the paper, leaving but a faint line. If, however, a darker surface be presented to the selenium, the current will diminish, the pencil of the receiver will be more firmly pressed upon the paper, and leave a darker line in proportion to the strength of the current.

This ingenious apparatus is apparently founded

upon a peculiar property of selenium, which offers an electrical resistance according to the amount of light to which it is exposed.

New Sugar and Tea.

A new source of sugar has been found in the stalks of maize or Indian corn, and the Agricultural Department of the United States Government have deemed the discovery of sufficient importance to warrant the carrying out of experiments on a large scale, to determine whether or not the new industry would be commercially profitable. Simultaneously with this announcement we also hear the grateful intelligence that a new tea has been introduced into Paris, in the shape of the Serkys tea, composed of certain balsamic herbs which grow along the skirts of the mountains of Mecca and Libanus. Serkys is considered good for chest diseases. It is made like any other tea, being infused for five minutes, then drunk hot. The tea-leaves, afterwards well stewed down, are said to make an excellent toilet water for the bath. It is to be obtained at Paris.

Gas at Sea.

The compressed gas system has been successfully employed in the lighting of buoys. As is well known, these useful channel marks are frequently run down at night; therefore the Trinity Board, after experiment, have adopted the lighting of buoys, and one to keep alight thirty-four days has actually been sent to Dundee.

The consumption of compressed gas is, in round numbers, one-sixth less than that of coal-gas, which is incompressible, and at less cost, for a certain number of hours. The buoy itself contains the gas, and is fitted with a regulator and a sort of lantern. It is by no means a pretty-looking construction, but use in this instance is preferable to ornament.

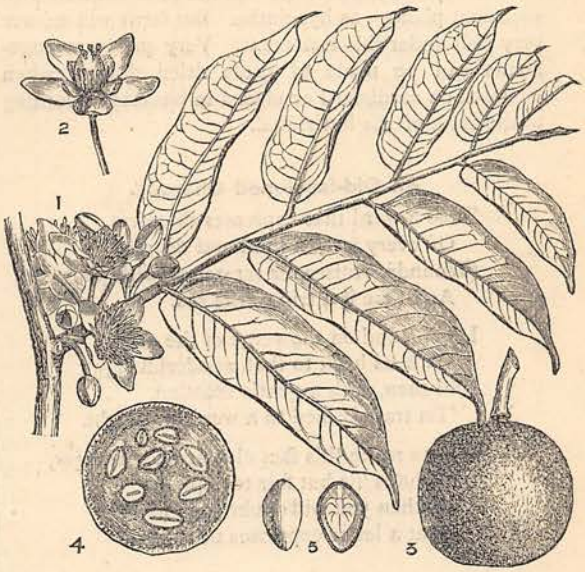
A buoy of average size can be constructed to burn (night and day) for three months, but if means can be devised to light these floating beacons by electricity, or better still to use the electric light, they might be lighted and extinguished at dusk and daylight, and so save the consumption of gas. The light can be seen at a distance of between three and four miles, which is sufficient for ordinary purposes. Another advantage claimed for this gas is that it cannot be extinguished readily—even water from a steam-worked engine having failed to put it out.

Answer to Mesostich on p. 256.

W o **M** an
O z **O** ne
Rozi **N** ante
Guin **E** vere
N **Y** m

Chaulmoogra Oil.

In Hindostan there is a strange set of beings styled Fakirs, who are partly mendicant priests, partly "medicine men." They are, in their latter capacity, often called upon to prescribe for skin diseases, and in such cases one of their chief remedies for centuries has consisted in an oil derived from a tree that bears the native name Chaulmoogra, and that is known botanically as *Gynocardia odorata*. There was, however, a serious drawback to its general adoption, inasmuch as it was almost impossible to obtain the oil in a pure state. It was subjected to gross adulteration in the bazaars where it was sold, and as it was a most difficult matter to detect the impurities, the dispensers enjoyed the greater immunity in their malpractices. After a series of careful experiments, Dr. Dymock at length devised a ready and efficient test for discovering the slightest impurity. Consequently, Chaulmoogra oil can now be had in a perfectly pure state in this country. It has already been adopted in several of the leading London hospitals, while many eminent physicians have testified to its great worth. As to the illnesses in which it is available, it may be mentioned that in the early stage of consumption it may be used with an almost certain hope of eliminating that dread disease from the system; that its curative powers have been strikingly manifested in cases of scrofula in children; that it is highly efficacious in rheumatism, cancer, leprosy, and indeed in all skin diseases; while its action in neuralgia and toothache* is very speedy. The oil may be taken



1. Branch of *Gynocardia odorata* (Chaulmoogra)—male flowers, ¼ nat. size.
2. A female flower.
3. Fruit. } ½ nat. size.
4. Cross-section of fruit. }
5. Seeds, outside and section, ½ nat. size.

internally either as a "dose" or in the form of capsules called "perles," or it may be applied externally as an ointment. Having the peculiar property of solidifying

* For either toothache or neuralgia, take equal portions of Chaulmoogra oil, camphor spirit, and chloroform, and apply on wool to the tooth affected or to the ear.

in our climate, it requires to be melted before a dose can be obtained; however, it readily liquefies. But the "perles" present the remedy in a convenient and handy form, and preserve it unchanged for an indefinite period.

Drying Flowers in Sand.

To dry flowers properly in sand, dishes sufficiently deep to permit the flowers to be covered at least an inch with sand should be procured. White scouring-sand will suit; lay it half an inch deep in the dish. Place your flowers, stem downwards, in this sandy layer, and sprinkle sand over them till all the petals are filled, and the blossom quite covered. It is as well to hold them firmly while sprinkling them, so as to insure a complete dusting. This operation over, place the dish in a warm and dry situation. In about a week you may examine the flowers, but some flowers will require a much longer time than others. Should there be any trace of moisture in the dish at the first inspection, dry the sand before using it again, or use new sand. This is a very much better way to dry flowers than by pressing them out. They are by this method kept in shape, their colours are preserved, and may be retained even for years. Bright flowers such as geraniums, carnations, pinks, pansies, gladiolus, &c., are particularly adapted to this method. White flowers will not answer, nor will the plan succeed with succulent plants—as hyacinths. But ferns will answer very well under this treatment. Very pretty arrangements can be made of these dried flowers when mounted on cardboard or placed in baskets, according to the taste of the individual.

An Old-fashioned Charade.

Take a word that expresses disasters
  Of every known kind and degree
(Wounds, bruises, or scratches, with plaisters),
  And take it a trip to the sea.

Let it stand on the verge of the ocean,
  With its back to that wonderful sight,
And then, with a gentle emotion,
  'Tis transformed to a word of delight.

But, to make this fact clearer and stronger,
  Perhaps 'tis but fair to explain
(And then you will doubt it no longer)
  That a letter expresses the main.

Reading and Eyesight.

We are most of us painfully aware of the fact that constant reading affects and injures the sight. This is owing, first, to close and permanent application of eyesight, which results in permanent tension of the organ; secondly, on the fact of printing taking the distracting contrast of black ink on a white ground; thirdly, the arrangement of horizontal lines which compel frequent and regular movement of the eye from one side of the book to the other. These three necessaries to ordinary reading produce serious results, and it is therefore with pleasure that we are enabled to advocate the practical suggestions made by M. Javel in a recent lecture. In order to avoid the injurious effects of reading, M. Javel counsels an avoidance of excess and the frequent taking of notes during study, or pausing for purposes of meditation. He also proposes the use of slightly tinted paper for books and magazines—light yellow being probably the best colour. He also recommends small books, or large volumes with a double column on each page—similar, we suppose, to the arrangement of the page of CASSELL'S FAMILY MAGAZINE. Also he warns us against insufficient light, and the use of too small print, which are indulged in by many people, and particularly the young. In addition to M. Javel's remarks we would insist on the injurious effect of over-reading during a railway journey, and also, for the same reason, deprecate the ordinary custom of too much gazing on a fleeting landscape while travelling by rail.

Machine-made Toys.

Hostility has often been manifested against the introduction of machinery into various trades, but it has always been lived down. Of this ignorant enmity the annals of the great industries of this country furnish many saddening examples, yet in no direction has the absurd doctrine been so signally refuted as in the toy trade. In bygone years toy-making was carried on in the forest hamlets and towns of Germany and Switzerland, where timber was abundant and labour plentiful and cheap. Whole families of peasants, whose wants were small and whose mode of living was primitively simple, were employed in this craft. Toy-making is still carried on in the same districts, but machinery has replaced the great bulk of hand-labour, so that one machine going ten hours a day can turn out as much work as a family toiling eighteen hours daily per week could do. Surely this revolution must have involved countless homes in utter ruin? The facts are all the other way. In consequence of the application of machinery, the toy industry has enormously developed, markets for toys have greatly increased, and the prices of these nursery goods have considerably diminished. Of the old hand-workers, some are now engaged in tending the machines, and the rest are occupied in piecing together the parts of the more intricate toy forms that machinery is unable to deal with. So that there is still work for all hands, from the aged grandsire to the four-year-old bairn, to do, while the last condition of the operatives is so far better than their first, that they not only get better wages and more regular employment, but their social position has also been vastly improved by the intermingling of families and the institution of schools, rendered necessary by the growing number of factories and the demand for artistic taste in fashioning the more expensive class of toys. Nuremberg alone turns out 23,000 tons of toys a year, with a variety in design amounting to 16,000 different patterns. Sonneberg, in Thuringia, not long ago a peaceful hamlet, now a thriving town, has an annual production of toys worth nearly two millions.