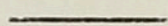


Part I.



Narrative and Historical.



## Part I.

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### Narrative and Historical.

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## Section 1.

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### Lock-making and Art Metal Working in America.\*

**O**F these two allied arts, rightly classified among the handmaids of architecture, the first has been revolutionized and the second practically created during the period since 1870.

Lock-making in America has largely been influenced by national character and environment. The locks first made here naturally followed European practice, but almost from the beginning a differentiation began by the substitution of cast for wrought metal. The European locksmith has always worked chiefly in wrought metal, fashioning it by hand into the finished product, whereas in America the higher cost of labor has precluded the employment of artisans of this type and compelled resort to less costly methods of production.

Influenced by these facts, the American lock-maker turned naturally to cast material in place of wrought, stimulated thereto by the superior quality of American cast iron. This change of material greatly reduced the cost of production, and soon led to changes in design from which was developed the now familiar American type of lock. The methods of production thus adopted minimized labor by producing in the foundry castings practically ready to be assembled and requiring only a trifling amount of drilling, filing or polishing to convert them into finished locks. But few machines were required, and these of the simplest character.

\* Written by the author and reproduced, by permission, from "A History of Architecture in New York," 1898.

See also companion paper constituting Section 2.



The product was handsome in appearance, of good mechanical action, and admirably served its purpose. Thus stood the art in 1870. The leading lock-makers desired and sought steadily to improve their product, but, unfortunately, influences were at work to pervert their methods of manufacture and to deteriorate their product. Competition, always active, prompted efforts to reduce the cost which ended in great debasement of quality, especially in the cheaper grades of goods, and under these conflicting influences the mechanical advancement of the art halted.

At about this time there was quietly introduced in the American market a novel lock product destined to revolutionize the industry. This was the outcome of the invention, by Linus Yale, Jr. (then the leading American maker of bank locks), of

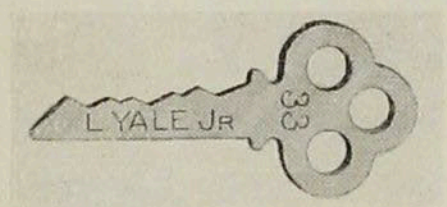


Fig. 1.

a key lock for general use of the type now known throughout the world as the Yale (or "cylinder") Lock. Its most striking feature was its key, the original form of which is shown by Fig. 1.

The mechanism of this lock precluded its production by ordinary methods and necessitated the employment of machinery of the same type as that already adopted in the manufacture of fire arms, sewing machines, etc. The makers of the Yale Lock were therefore forced to evolve new methods of production suited to the new product, and this fact in turn had a marked influence upon the product itself. The new product was thus subjected from the outset to two dominating influences, emanating from the characters and aims of the men by whom the enterprise was started, viz.: that resulting from the application of new ideas and inventions involving radical departures from accepted lines of construction, and that resulting from a higher ideal of mechanical execution and the utilization for this purpose of improved machinery and processes.



The standards adopted in connection with the new product thus begun have since been so generally incorporated into American practice as to call for a brief reference to their origin. The new industry was organized in October, 1868, at Stamford, Conn., by Linus Yale, Jr., and Henry R. Towne. The former died prematurely in December of the same year and the enterprise, under the corporate name of The Yale & Towne Mfg. Co., has since been conducted by the latter as President; its work, which originally required only thirty employees, now requiring, under normal conditions, nearly three thousand, and its products embracing a vast variety of articles.

The fundamental features of Mr. Yale's inventions were (1) a small flat key; (2) the combination of this key with pin-tumblers; (3) a tumbler case or "cylinder" bearing a fixed relationship to the surface of the door and connected with the bolt work in the lock case; and (4) the adoption of heavier parts and better

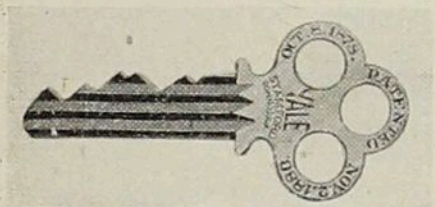


Fig. 2.

proportions in all important details. Among the many features since added by those who have carried forward the work so well begun by Mr. Yale are (5) the adoption of a higher standard of mechanical design; (6) the employment in manufacture of the most modern machine tools and processes; and (7) the application to the visible parts of locks and other hardware of the true principles of decorative art, which was accomplished by seeking the coöperation of architects and other professional designers in this field.

The original Flat key of Mr. Yale was superseded about 1882 by the improved Corrugated key, shown by Fig. 2, and this in turn, about 1892, by the still better "Paracentric" key now used with all genuine Yale Locks and shown by Fig. 3 on next page.\*

\* See also Section 5, The Yale Lock



At first the conditions involved implied, unavoidably, much higher cost for the Yale Locks than those for ordinary character, but this difference has steadily diminished until to-day the Yale Lock is the accepted standard for all uses where excellence or security are the requirements.

Recognizing the fact that, for many uses, locks of less elaborate character are needed, the makers of the Yale Lock undertook, years ago, to elevate the character of common locks by designing and making a complementary line of Builders' Locks having the same high quality of design and workmanship as the Yale Lock, but comparing in cost with locks of the ordinary type. To this end they introduced, about 1873, the line of "Standard

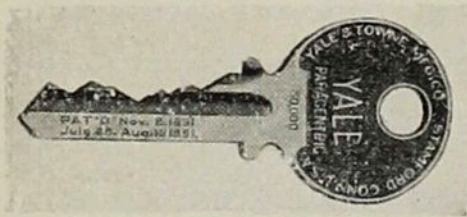


Fig. 3.

Locks," (the features of which, proving to be sound and correct, have since become standard in the trade and have been reproduced more or less closely by all of the leading manufacturers) and

about 1890 made a further advance by introducing a mortise door lock made of wrought steel in place of cast iron, which immediately proved popular and was quickly followed by a line of wrought metal locks made by the Russell & Erwin Manufacturing Company, which also have enjoyed large sale. Still later the Warner Lock Company introduced a very attractive line of wrought steel locks, the popularity of which has confirmed the soundness of this change in material.

Recently The Yale & Towne Manufacturing Company has made a still more radical advance by the introduction of its line of Vulcan Locks,\* in which every part is formed of wrought material, made by machine processes and therefore interchangeable, and which embodies also improvements in lock mechanism almost as radical as those of the original Yale Lock. Other lock-makers

\* See Part II. Section 5, Wrought Metal Locks.



have followed many of the leads thus opened, and the whole product stands to-day on a higher plane of design and execution than ever before, and the work of American lock-makers easily excels that of all others.

Coincidentally with the development of the art of lock-making in America during the past twenty-five years, which has been traced in outline above, there has occurred an equal, and in some respects more surprising, development in the application to the Hardware of Ornament (especially to that used with locks), of true principles of artistic design. This subject is discussed elsewhere,\* as to its artistic qualities and effects, but a few words concerning it may be permitted here as to the mechanical developments which made it possible.

The earlier efforts at decoration in hardware were feeble, crude and meretricious. Credit is due to the Russell & Erwin Manufacturing Company for being the first to perceive the opportunity for better things in this field and, by the introduction of their designs in "Compression Bronze," about 1872, to introduce ornamental hardware thoroughly excellent in design and admirable in execution. A little later further progress in this field was made by Hopkins & Dickinson, but for some reason, possibly because the time was not yet ripe, these earlier efforts were not persisted in, and the advance was not maintained. The stimulus of the Centennial Exhibition in 1876, upon American art, was speedily felt, however, in the field of hardware, and soon resulted in a development of far-reaching character. In this, as in the line of mechanical advancement, The Yale & Towne Manufacturing Company took the leading part, being greatly aided by the improved methods of production which it had been forced to devise in accomplishing the improvements in design, workmanship and finish embodied in its

\* See Section 2, Artistic Hardware.



mechanical products, as already explained. Aided by that experience, it found effective means for producing economically the elaborate, beautiful and varied work of decorative character suggested by the drawings of the architects and skilled designers whose professional assistance it sought. In the attainment of this end it made use of all the processes and appliances known to the arts of the modeler, the molder, the chaser and finisher, supplementing them wherever advantageous by those of the metallurgist, the mechanic and the chemist.

Out of this union of old-world skill and training in the decorative arts, and of new-world ingenuity and facility in the mechanical arts, has sprung an entirely new product, rivaling in artistic qualities the best work of the past, and produced at a cost which makes it available for almost every purpose of use or embellishment, thus bringing, in this field of decoration, the true principles of art literally to the doors of all classes in the community, and thereby contributing in no small degree to the education of the people, both in the appreciation and the employment of true art in all its forms.

We have mentioned here only the names of those who have been leaders in the evolution of American locks and hardware during the past twenty-five years toward higher mechanical and artistic excellence, but the efforts of these leaders have been greatly stimulated and reënforced by those of their competitors. It is true that interested motives underlay these efforts, but in a certain sense that statement applies equally to all artistic work, and credit is none the less due to those who have borne their part in the advancement of this important national industry whose record we have endeavored to trace in this brief outline.



## Section 2.

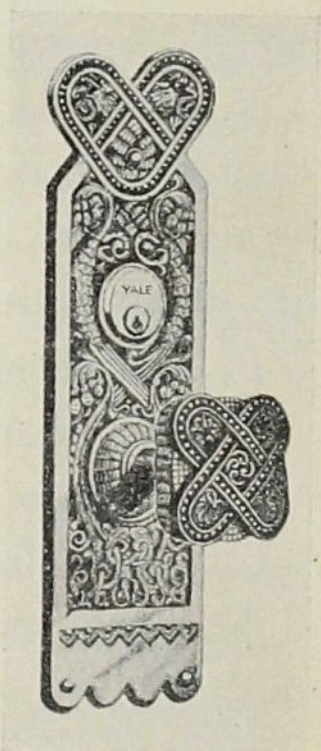
### Artistic Hardware.\*

UNTIL about twenty years ago no real attempt had been made to give any artistic character to the metal work used in the buildings in the United States, or, indeed, to any other metal work whatever.

The cast iron stoves were often crowned or incrustated with what the makers of them imagined to be ornaments, but nothing could be cruder, more inappropriate, or, to an educated taste, more offensive than these applications.

They were even cruder than the British product of the same period, and it was doubtless the crudity of this product that led Ruskin to say that "no ornaments are so cold, clumsy, and vulgar, so essentially incapable of a fine line or graceful shadow, as those of cast iron."

As we shall see, the critic spoke, as he has so often done, in his haste, and transferred the intractability of the material to what was really the incompetency of those who had undertaken to handle it for any purpose but that of strict utility. Cast iron, setting aside its liability to oxidation, is as available a material, as "capable of a fine line or graceful shadow" as cast bronze, and as available, not alone for purposes of ornament, but as Russian founders have shown, even for figure-sculpture. Forty or even thirty years ago the American who was sufficiently cultivated to be



About 1870.

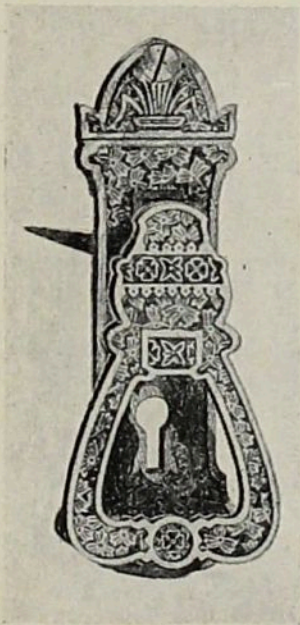
\* Written, at the author's suggestion, by the well-known architectural critic, Mr. Montgomery Schuyler, of New York, and reproduced by permission from "A History of Architecture in New York," 1898.

See also companion paper constituting Section 1.



revolted by the false pretense of art in the metal fittings of his house had no resource but to deny himself any pretense of art, and to take refuge in an absolute simplicity, which was only the absence but not the negation of the artistic element. In costly houses the hinge plates and door knobs and escutcheons showed plain surfaces of metal, of which the utmost pretension was to be silvered when they were applied to the solid mahogany doors of the period. In the less conspicuous rooms the knobs and their roses were of brass, or still oftener, of smooth white porcelain. The effect was not in the least artistic, but it was highly respectable. Meanwhile, it was the cheaper work which was known to the trade and to the public as "fancy." In this it was attempted to make up for the lack of evidently costly material by the addition of the ornament. This was not art, for the reason that, as has been well said, "art is something done by an artist."

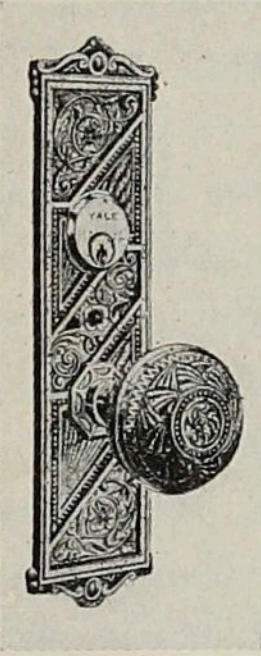
This ornament was designed by the pattern-makers, who were entirely untutored, either in the principles or in the historical examples of ornamental design. They were as incapable of conventionalizing natural forms with due regard to the purpose of the design and the material of which, and the processes by which, it was to be executed, as they were ignorant of the



About 1872.

distinguishing features of historical styles. Their work, accordingly, could be neither pure nor peaceable, and could have none but a degrading effect upon the taste of those who had its results continually before their eyes. It is only "something done by an artist" that can educate the public taste to demanding something better than is supplied to it, and in this department there were no artists at home, and no examples imported from abroad and so exhibited as to have any educational effect upon manu-

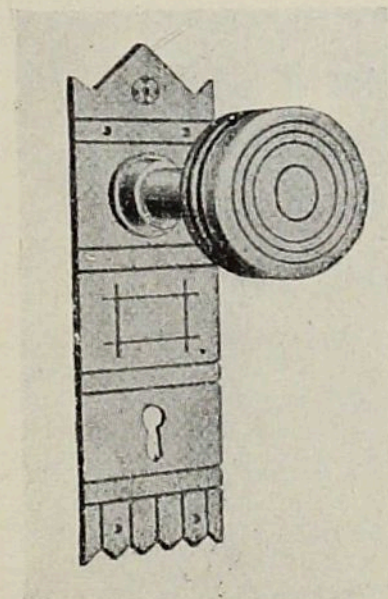




About 1875.

facturers or purchasers. Up to 1870, it may be said almost without reservation, there was no choice for the purchaser of hardware except between work which was simply unrelated to the sense of beauty and work which was revolting to it.

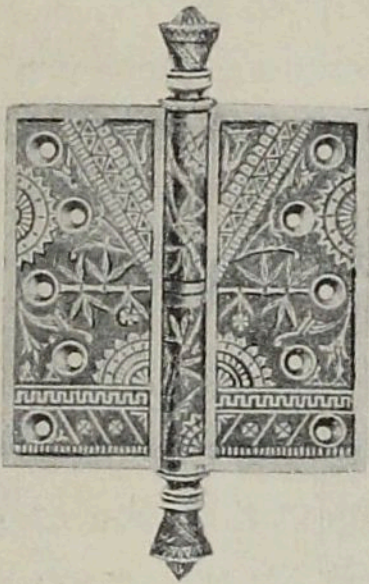
In order to see what the state of things was, it is necessary to resort to illustration. It is unnecessary to reproduce any of the plain unpretentious and inoffensive work for the reason that there is nothing in it to illustrate, and also for the reason that it continues to be made and to enjoy a considerable vogue. There are cultivated, but timid, persons who desire to be on the safe side, and who are conscious that entire simplicity is safe. They know that it is inoffensive, and that what used to be the "fancy" articles submitted to them in this line are abominable, and they are unaware that positively artistic and attractive work is to be had. If the choice were still between work negatively inoffensive and work positively repulsive, they would be quite right. It would be a mistake to

About 1876.  
"Eastlake"

suppose that such work has been altogether expelled. In some very recent trade catalogues "fancy" hardware, as crude as that of 1870, continues to be offered, and to be offered at high prices, and obviously it would not continue to be offered if it did not continue to be demanded.

Again, there are architects who, although they can scarcely help being aware that there is now a choice between what is inoffensive and what is attractive, as well as between what is inoffensive and what is re-





About 1877.

pulsive, do not take advantage of their knowledge, and are still content to be "safe."

Although the crude and unconsciously grotesque "fancy hardware" of the last generation continues to be made, it is no longer familiar to those who would be likely to be offended by it. Some typical examples are accordingly presented, culled for the most part from old trade catalogues, but some also, as will be seen, almost as

bad as the worst, from catalogues found almost within the present decade. It will be seen from the illustrations that these attempts were as irrational as they were inartistic, and that the most suitable and convenient forms which were adhered to in the common commercial work, were abandoned in the fancy work for forms that were practically inconvenient. Rather, their irrationality was a part of their ugliness. A great critic has said "a thing has style when it has the expression appropriate to its uses," and this expression, though it may be heightened by modeling and decoration, cannot be attained at all unless the object has, in the first place, the form appropriate to its uses.



About 1880.

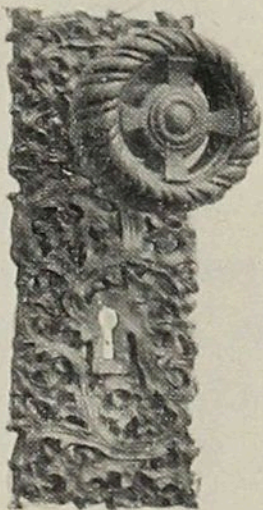
It was in 1872 that the first definite promise of better things was made. This was in the work of the Russell & Erwin Manufacturing Company. It consisted, as is evident, in the employment of a trained designer, in the first place, to rationalize, and, in the second place, to decorate, the forms which had been in the first place distorted, and in the second defaced, with no more rational and artistic purpose than to produce something "fancy." Func-



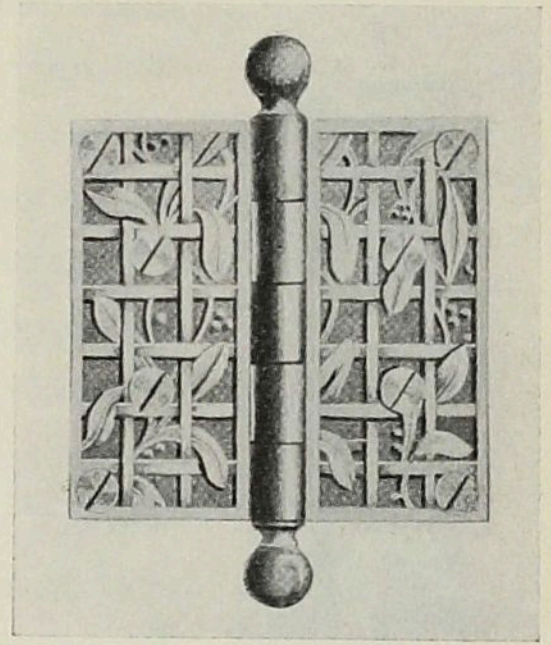
tion, material and process are recognized in these essays, and that recognition is the beginning of progress. These early attempts may now seem crude enough, but it is to be borne in mind that the vast improvement which has since been effected is not alone an advance in design. It is an advance also in the mechanical execution of the design, in which mechanical labor has risen into artistic craftsmanship.

This advance is dependent upon the coöperation with the artistic designer of an enlightened manufacturer, who is willing to take trouble to secure better results, and to make expenditures upon experiments, and the process takes time as well as trouble and money.

Undoubtedly, however, the main stimulus to the Renaissance, or, rather, the "Naissance" in this country of artistic handicraft in this branch, as in so many other branches, was the Centennial Exposition of 1876.



About 1887.

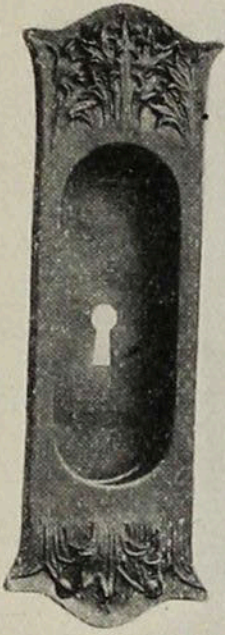


About 1884.

The notion that the general design of a dwelling might be carried into its details and fittings, so that all the parts should be "of a piece," was practically new to most visitors.

Only in churches and public buildings, especially in churches, had it been attempted heretofore, and even in these it had been very imperfectly performed. It was precisely in the particular of metal fittings that the shortcomings were most manifest, and this for the reason that the architect had not



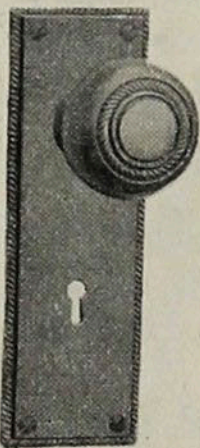


About 1890.

had the coöperation of the manufacturer. In masonry and in woodwork the designer could secure the execution of his design. But in cast metal the cost of a special set of castings for an ordinary dwelling house or commercial building, was quite prohibitory. The architect, even when he was consulted, was forced to limit himself to what could be found "in stock." As there was nothing there that was exactly suitable to his purpose, he was forced to abandon the attempt to make these fittings a positive enhancement of the effect of his work, and taking refuge in the plainest

and simplest objects that could be had, to content himself with the humbler attainment of mere inoffensiveness.

The first essays in the direction of making the hardware of a house conform to its furniture and fittings were not very successful, for the reason that they were experiments in a passing fashion. The Gothic revival was at that time in full possession of the architectural field in England, and commanded also the sympathy of the most thoughtful and progressive American architects. But the attempt to apply the principles of Gothic art to



About 1891.

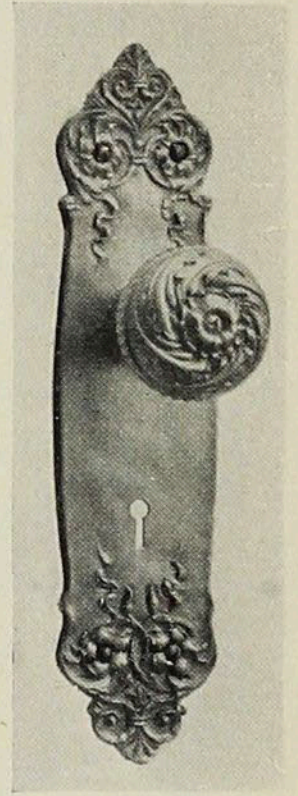
furniture constructed by modern methods, had resulted only in what was called "Eastlake Furniture," which was even then suspected, and is now generally recognized to be ugly and cumbersome. The Eastlake hardware was an improvement upon what had preceded it, in that it was designed with reference to the materials and the process employed, but its forms failed to commend themselves as beautiful or appropriate, and now appear hopelessly antiquated. Neverthe-



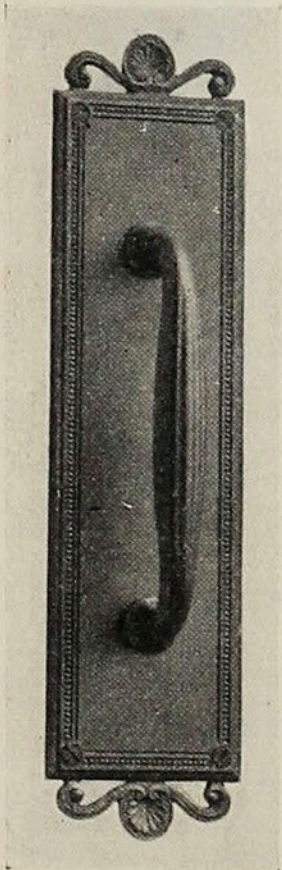
less, in so far as they proceeded from a real consideration of material and function they contained the germs of progress. Later work upon the same lines showed a real development, and it continued to be made by some firms, and with increasing success, down almost to the present decade.

But meanwhile, a much more comprehensive movement had been begun, and it had been begun under happier auspices. That is to say, it was marked by the coöperation of artistic designers, and of manufacturers who were willing to take trouble and to spend money in securing artistic results. It was about 1883 that the Romanesque revival, stimulated by the success and vogue of the works of Richardson, had begun to make its way over the coun-

try, and had enlisted the active-minded and progressive young architects, the successors of those who, in the previous decade, had given themselves to the advancement of Victorian Gothic, and in some cases the same persons. The Romanesque had taken almost undisputed possession of the West, and along with those of its practitioners, who followed it simply because it was the fashion, there were others who believed in it, and who were earnest in following out its possibilities. Chicago was the centre of this cult in the West, and several of the most capable of the designers of Chicago became interested in the efforts of The Yale & Towne Manufacturing Company to produce much more artistic work in cast metal than had been produced heretofore. Among

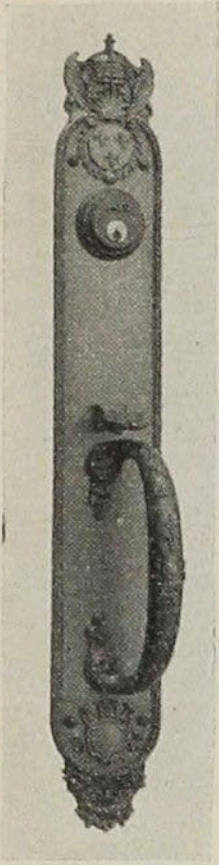


About 1892.



About 1892.





About 1892.

these were John W. Root, Louis H. Sullivan and W. B. Mundie. Many of the designs procured from them are still current and among the standard products of the company for which they were made. They were so manifestly superior to anything that had been done before in this country, that a distinct demand for artistic hardware followed upon the supply of it. The demand thus created soon stimulated other manufacturers to follow the lead thus opened; sometimes through more or less direct imitations of successful designs, more rarely by the same means by which those designs had been

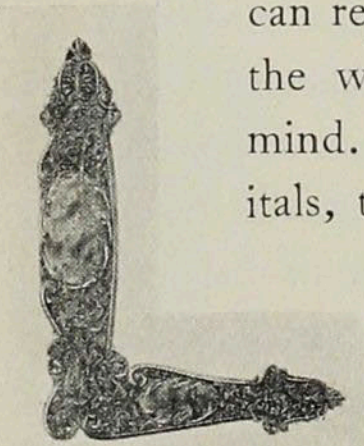
produced; that is to say by the employment of competent designers.

But, although the results of this employment were so gratifying they were not at this stage completely satisfactory. A main charm of artistic handicraft is that in such handicraft the designer is also the artificer. No execution of an



About 1893.

architect's drawing by a mere mechanic, never so highly skilled, can replace the attractiveness of the work in which the workman is shaping the creation of his own mind. It is this which distinguishes the stone capitals, the wooden furniture, the metallic grilles and hinges and latches of the best mediæval work from the most successful modern reproductions or imitations. Of course this method is not directly applicable to modern manufacturing conditions, in which the artistic end



About 1894.

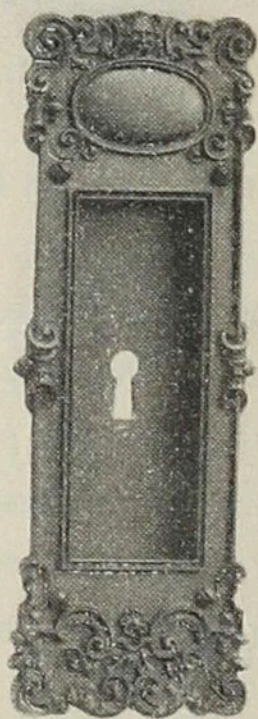




About 1895.

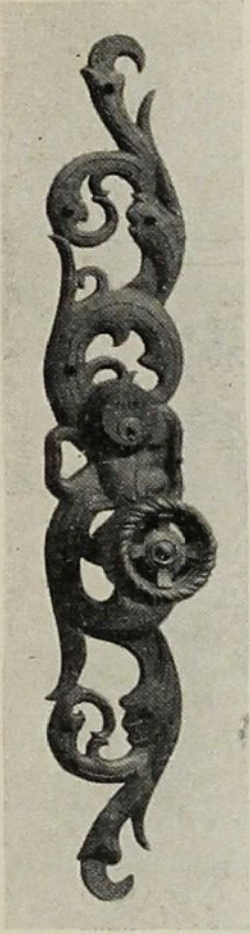
must be attained within a predetermined limit of cost. The closest approach to it is made when the designer works in the closest possible connection with the workman; when he does his designing in the factory in which it is to be executed, and acquires by daily contact, an intimate, almost intuitive, knowledge of the possibilities of the means by which his design is to be reproduced. This is the first condition of progress in industrial art. Moreover, in cast work there is necessary the intervention between the design and the product of a sympathetic and highly skilled artisan in the modeler, whose intelligent coöperation is required for the interpretation of the design. After the casting is produced, hand work is again brought into requisition for the finishing touches. In the work of the highest class, and also necessarily of the greatest cost, there is scarcely any limit to the extent to which this finishing work may be carried. When hand chasing is applied by an artistic artisan without restriction of time or money, the result even of a casting is an original work of art. But evidently for the production of such work by modern industrial methods, it is necessary that the employer should himself be appreciative of the value of artistic effect, and willing, as has been said before, to bear the expense of experiments toward improving them. When all these conditions concur, the result is the closest approach possible in our modern wholesale and commercial production to the art-work of ancient craftsmanship.

Happily, all these conditions concurred in



About 1895.

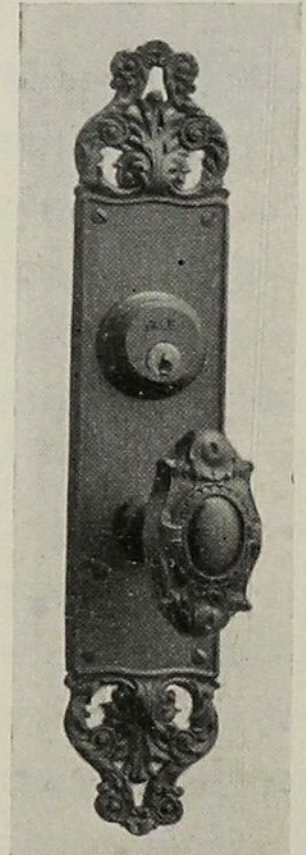




About 1895.

the case of The Yale & Towne Manufacturing Company, the pioneer in the production of artistic hardware in America, and, as a consequence, the work of this kind produced here within the present decade by them, and by others who have followed them, far surpasses in artistic merit that produced in any other country, excepting only in France. France is our only competitor in quality; in cheapness of production, and, therefore, in general acceptability, there is no competition, so much larger is here the use of labor-saving machinery, and so extensively has it been invoked by American manufacturers without detriment to the artistic quality of the product.

In range and variety there is no comparison between what may be seen in the catalogues or in the show-rooms of the leading American manufacturers. The advantage on the part of the American manufacturers in variety of design comes in part from the much greater variety of architectural styles habitually employed by American architects. While in Europe the different rooms of a dwelling of much pretension may be finished in different styles, or in distinct modifications of the same national styles, there is no such variety, either in domestic or commercial architecture, as obtains in this country. Greek, Romanesque, Colonial, Moorish, several phases of the Gothic and several national varieties of the Renaissance, with several subdivisions of each, are all current modes of



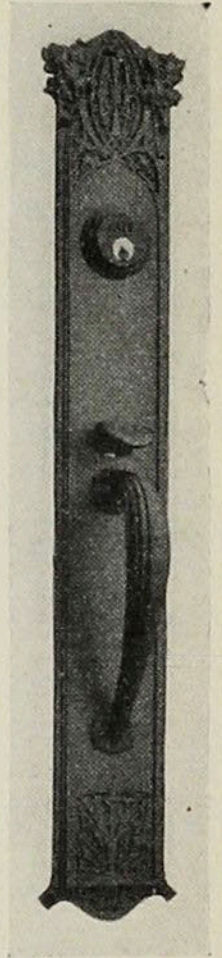
About 1896.



building to any one of which the interior fittings may be required to conform. Of each of these there are to be had the objects of which "Builders' Hardware" consists, designed and executed with archæological accuracy, and with high artistic skill. Considering the fewness and simplicity of these objects, escutcheon plates, knobs, handles, hinges, etc., the wealth and profusion of design which have been applied to them are wonderful. The choice is no longer, as formerly, between things plain and merely inoffensive, and things "fancy" and revolting. It is a choice between adornments that are positively attractive, and the sum of which constitutes one of the most striking and successful of American achievements in "applied art."

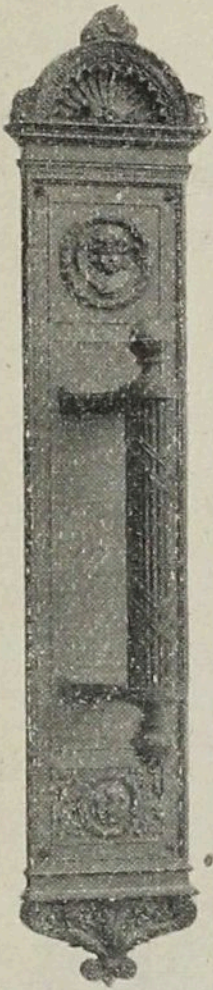
Although twenty years almost covers the period of this artistic development, it has had many phases. At the beginning of it the best that could be had in this way was a costly material treated with the utmost plainness. This refuge is still regarded as the only safe one in some parts of the United States, and, rather curiously, especially in Boston, where the artistic treatment of common subjects might have been expected, if anywhere, to receive a welcome. As a matter of fact, the West, which, as we have seen, was very largely concerned through its designers, in the production of this phase of household art, is still much in advance of the East in its appreciation.

Costly materials, even the precious metals, are still employed, but even in these "the workmanship surpasses the material," and equally beautiful results are obtained from the humbler metals. The dictum of Mr. Ruskin, which we have quoted at the beginning of these remarks, has been triumphantly refuted



About 1897.





About 1898.

by the work of American foundries. Bronze is still the metal most employed, but the adaption to ornamental hardware of the Bower-Barff process, which, if it does not render iron absolutely "rustless," at least very greatly retards and mitigates its oxidation, has given to cast iron a new availableness. This adaption was successfully made, after a series of experiments, by The Yale & Towne Manufacturing Company, and unpainted and confessed cast iron thereupon became a noble as well as a useful metal. In beauty of surface, in plasticity, in "capability of fine line and graceful shadow," it appears, for places and purposes to which its use is appropriate, the most beautiful of all. This peculiar beauty it owes to the "dead finish" which it is especially capable of receiving, and to the successful efforts which have been made to attain a characteristic treatment in design, as well as in the details of execution. \* \* \* \* \*

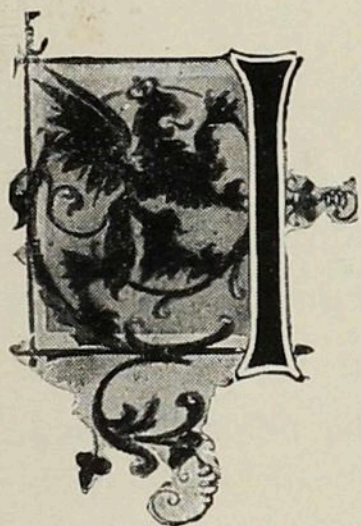
Perhaps the greatest achievement in the treatment of bronze is the imitation, by chemical process, of the patina, which is the result in antiques of the slow verduring of time. The common imitations of this patina by pigment are untrustworthy and transient. The patina chemically produced is the thing itself, and is one of the highest achievements of the American development of artistic hardware, which, in turn, is one of the most important contributions to this country of the advancement of industrial art. †

† See also Part III, Section 7, Metals and Finishes.



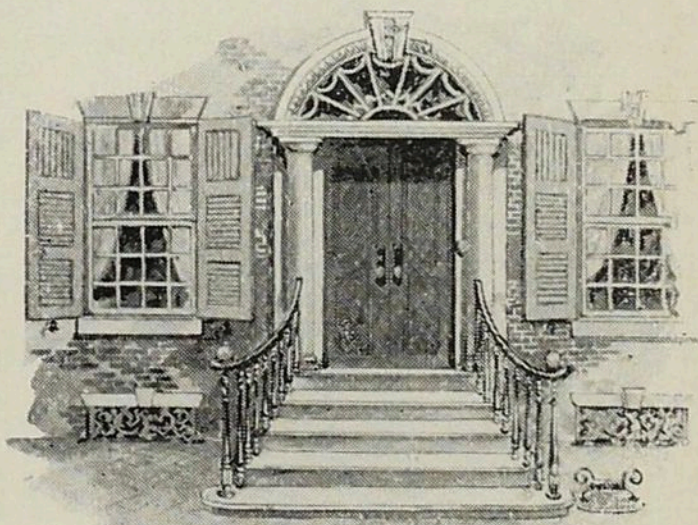
## Section 3.

### Artist and Artisan.\*



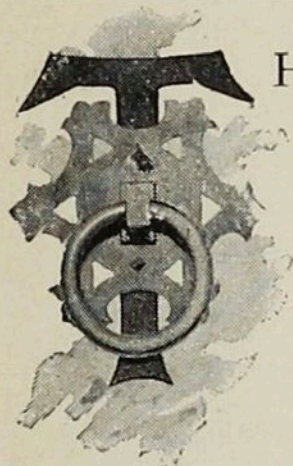
IN a most interesting address, delivered many years ago, upon the subject of the relation between the Artist and the Artisan, the late Cardinal Wiseman drew a graphic picture of the difference between the industrial art of former times and the dilettanteism of to-day. As an apt illustration he described the entrance of an old Roman householder into one of the modern museums of antiquities and curios, and depicted him ordering the various articles to be put back to their proper uses. Vases, urns, and other vessels of most artistic form and ornament, he promptly sent to the kitchen, for which they were intended.

A rare mosaic pavement, which the modern lover of art had protected with a heavy railing, was relaid in the entrance way, to be trodden under foot by every passing slave, and so in turn each rare and beautiful object of art was dismissed to some office of service in which its artistic side was made secondary to its useful function, and the empty show-cases were thrown aside as useless.



\* Written at the author's suggestion by Mr. Henry Harrison Suplee, and originally printed in brochure form.





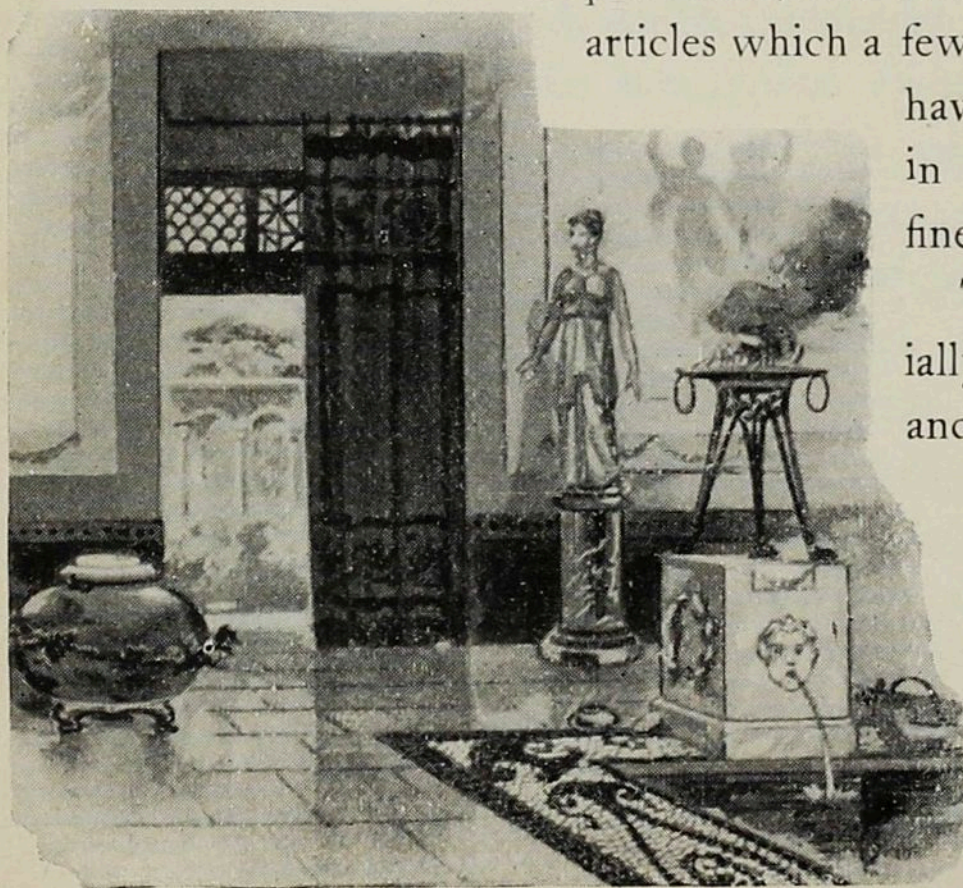
HE lesson which the wise Cardinal sought to teach has not been altogether lost in these latter days of household art, and in the new Renaissance of true artistic taste, the union of artist and artisan and the combination of the beautiful with the useful are once more seen.

In a new country like our own, the growth of taste in household art and the appreciation of the right use of art work come only with increase of leisure and the relaxation from daily business; but, as the influence of culture, art, and travel grows daily more powerful, so the great tide of public sentiment follows the lead which only a brief time before seemed far in advance.

Instead of looking only to art galleries and public collections for examples of art work, and being content with an occasional glimpse of some rare bronze or exquisite forging through the panels of a cabinet, the American connoisseur demands not only

possession, but also the daily use of articles which a few years ago would have been cherished in some museum of fine arts.

This is true especially of the great and constantly increasing field of art which includes all forms of metal work used in household decoration. The



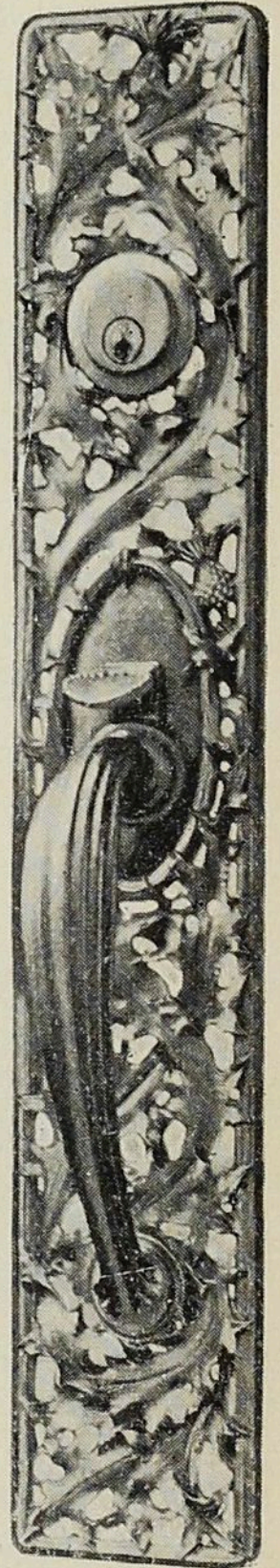


modern collector of the works of the modern artisan makes his house the cabinet in which these works are placed, and, instead of keeping them under glass in an art gallery, he puts them to their rightful use, to be seen and handled by all who come and go.

The entrance door of his residence bears an escutcheon plate which is itself a gem of art work in a precious metal or fine bronze, while the strong yet graceful hinge-straps are examples at the same time of artistic design and skillful interpretation.

Passing on through the inner door, in which a wrought grille of exquisite tracery is set, we notice the fitness with which all the metal is chosen to accord with the surroundings. The elaborate detail borne by the escutcheon plate of the outer door is in perfect harmony with the ornate Renaissance work upon the capitals and cornice above, while within the same motive is modified in treatment and finish to harmonize with the altered conditions. Passing from room to room, the evidence of artistic taste is apparent, and, without ever becoming obtrusive, the metal work is everywhere seen to assert its rightful position as a fitting subject for treatment at once appropriate and beautiful.

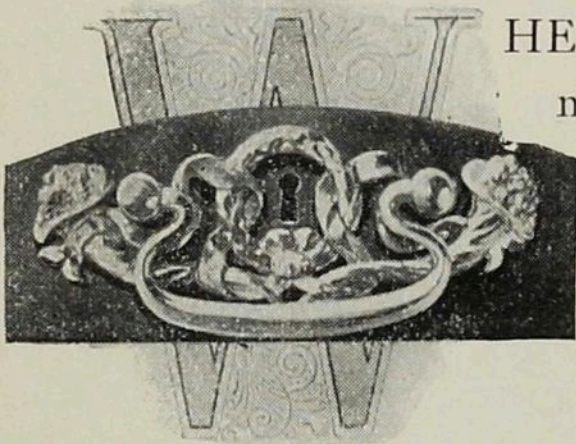
Is this the palace of a prince, or the home of a millionaire, through which we have so hurriedly glanced? It is indeed a house beautiful, but there are many other such of equal beauty and yet not of extravagant appearance. If such examples of the metal-worker's art can be so freely distributed, there must be some





readier way of procuring them than the method which gave existence to the art work of the older days. Only king or pontiff could command the skill of a Benvenuto Cellini to form the mould and handle the graver and chasing tools, and here is work which compares with that of the old times, on the doors and windows of residences and hotels, churches and business-blocks, far exceeding in variety and quantity the possible results of individual labor and skill. At the same time, the art metal work is in appearance and character so far above the so-called manufactured articles that no comparison is to be made.

Yet, if organized production under skillful supervision, with all the great advantages which accompany the facilities for making, handling, and display possessed by organization, constitute manufacturing, these products of the highest artistic merit are manufactured; and it is the result of a system of manufacture which retains the individualism of the artist, and adds to it the productive capacity of a thousand artisans, which makes the use of modern art metal work a household possibility.



WHEN the householder of to-day seeks a new home, he calls to him the architect to prepare plans and elevations, and to put into practical form for construction the ideas which he has in mind, and also to guide by counsel and experience the plans

which he hopes to see realized in the completed building.

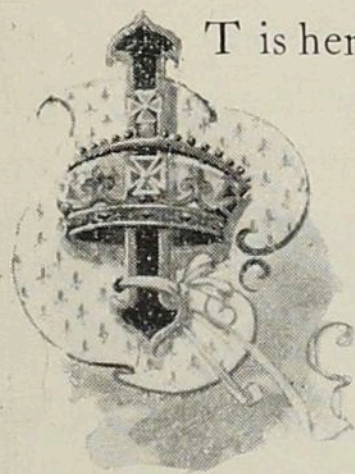
It is in this work that the client and architect may, if they will, find most pleasing and congenial employment, and the pleasure of witnessing the realization of the long-studied plans in the home where perhaps many coming years are to be spent.

In all this work, the interest increases as the house approaches



completion, and not the least interesting portion of the work is the selection of the metal trimmings and ornament. In this branch of the decoration of the house, the new order of treatment is a revelation to many, and often the client, from lack of information, fails to profit by what has already been done by specialists in art metal work.

He has no wish to turn over to the mechanical taste of the builder the selection of the metal work, which, though part of the useful hardware of the building, should be also conspicuously a portion of its artistic decoration. Yet, as in the older days when art was truly recognized, the artistic instinct is to ornament in a consistent spirit the mechanical devices which are to be used for strength and security, and, to select such objects intelligently, a knowledge of mechanical excellence must be combined with artistic taste.



It is here that the systematized production of art metal work for household use and decoration, made under all the favorable conditions of organized manufacture, enters the field to give practical solution to the problem of the union of the artist and the artisan, and it is by such means that the modern house beautiful is enabled to bear at every turn the products of artistic taste in bronze, or brass, or beaten iron.

The organization by which the production of these objects of art and usefulness has been so notably advanced is The Yale & Towne Manufacturing Company, and by the earnest and intelligent efforts of this Company the possibilities of art industry in metal work have been revealed. It is to its warerooms in New York, Chicago, Philadelphia, and Boston that the master (and often the mistress also) of the house turns, and, accompanied



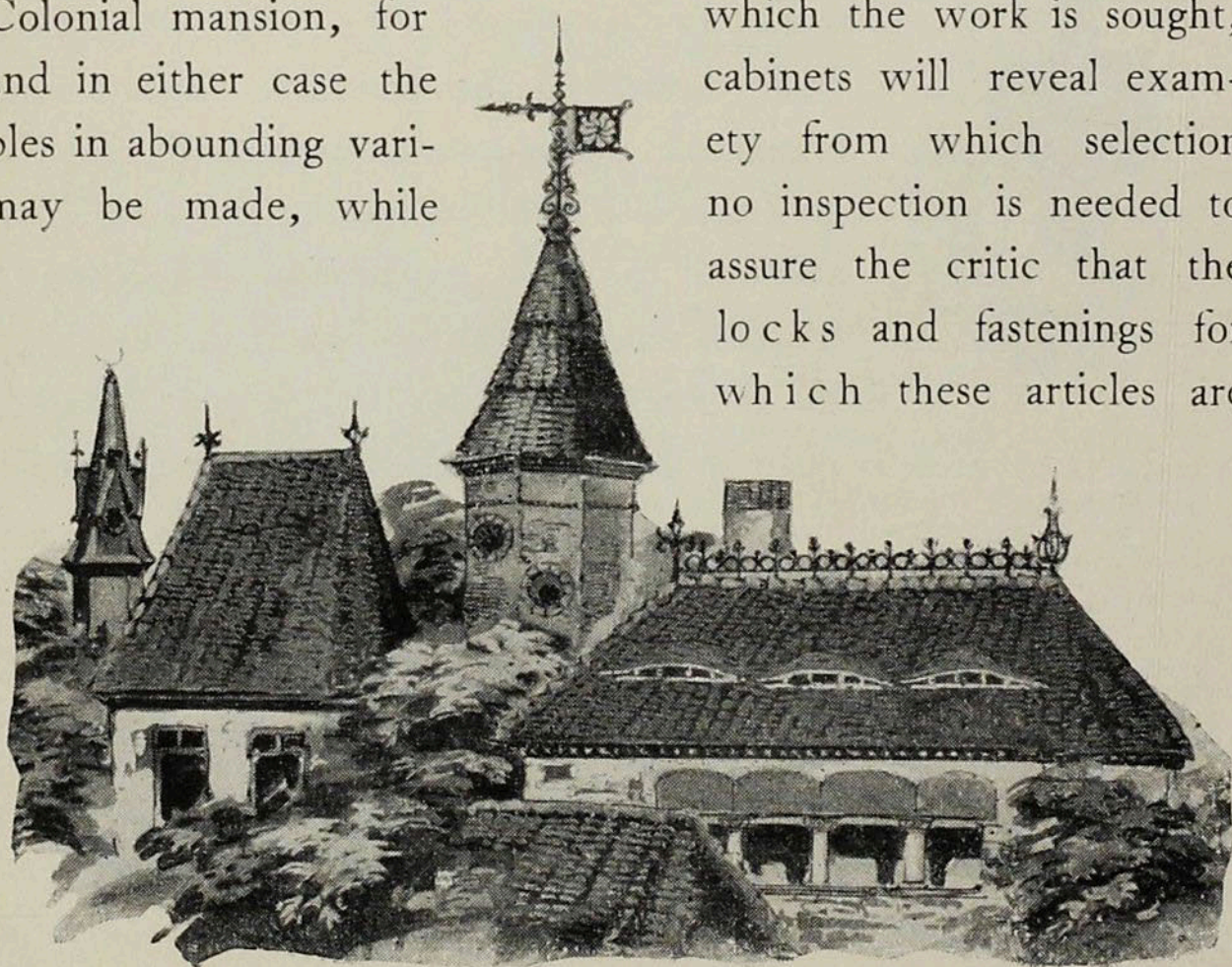
by his architect and adviser, examines and considers the examples from which his choice may be made.

Here are objects of art metal work in the schools of all times and lands: delicate Byzantine tracery, bold and rugged Romanesque work, the later Gothic, our own Colonial and many others. The plans and sketches which embody the design for the building may here be studied and compared with the escutcheon plates, knobs and hinge-straps which are to be used, and the true consistent effect and balance of proportion kept always in sight.

Should the building be constructed with all the revived classical feeling of the Renaissance, here will be found plates and knobs exquisitely chased by the skillful hands of artists in metal work, and richly plated with silver or gold, while the hinge-straps retain the severe outline of the school, though bearing on their surfaces the same delicate work.

Perhaps it is a country house after the Elizabethan time, or a Colonial mansion, for and in either case the examples in abounding variety may be made, while

which the work is sought, cabinets will reveal examples from which selection no inspection is needed to assure the critic that the locks and fastenings for which these articles are





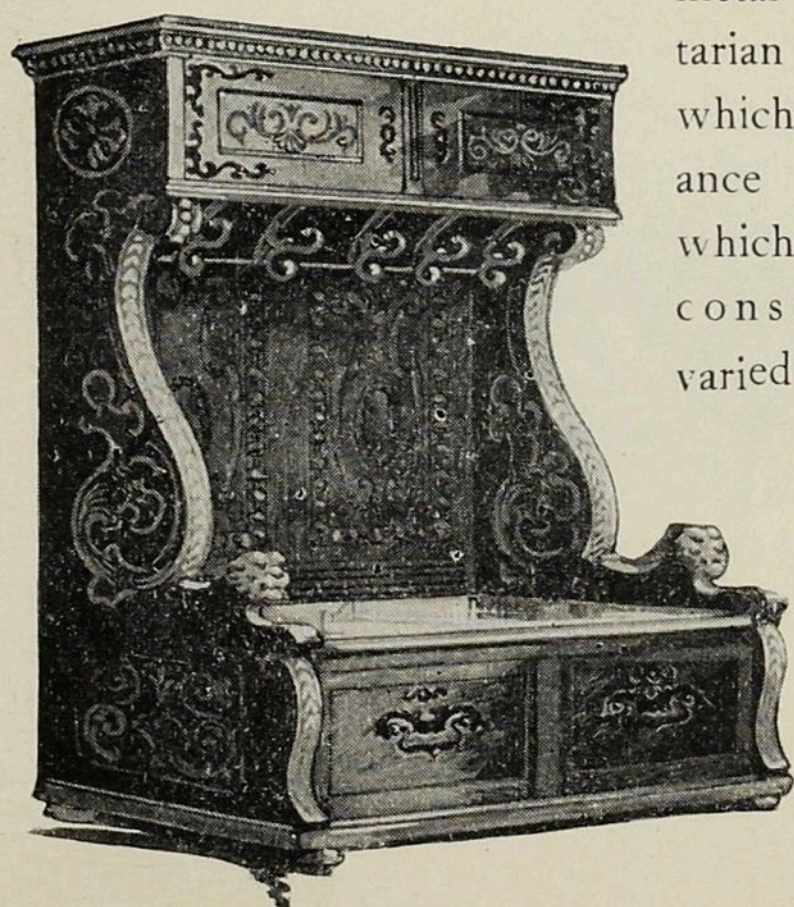
adapted embody the highest mechanical excellence. Not only for the outer fastenings and ornament of the building, but also for interior work, the same great variety of articles is made. Cabinet hinge-plates, drawer-pulls, and key-plates in many artistic ornamentations are in great profusion of design and adapted for all situations, and the same artistic skill which marks the execution of the larger work is revealed in the smaller cabinet trimmings.

It is not only the metal work itself, but the metal work in combination with its surroundings, which must influence the choice of the builder of the house, and to this end the numerous examples are placed in appropriate settings by being mounted upon suitable panels of wood, with the finish best suited to display to highest advantage the combination of wood and metal, and these cabinets of examples may serve at the same time to guide in the choice both of metal trimmings and finish of wood-work.

In connection with this survey of the artistic side of modern

metal work, there is also a utilitarian side to be considered ; one which is fully equal in importance to the former, and with which it is combined to form a consistent whole. All these varied subjects of artistic design

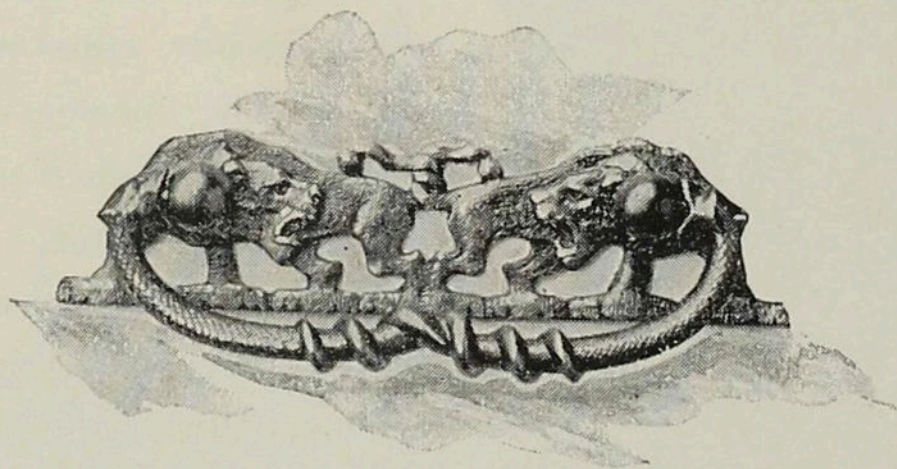
are intended to be used with locks and other fastenings of security, and to this branch of the artisan's work have been brought care and skill not inferior to the art of the designer. The





results of these efforts are the world-famous Yale Locks, giving such infinity of combinations and united qualities of greatest security and compactness that they are far in advance of all other locks for every purpose. Many forms of Yale Locks have been designed, all of which are adapted to be used with the most artistic subjects in metal ornamentations, thus forming combinations of beauty and utility not hitherto found, and impossible of production elsewhere.

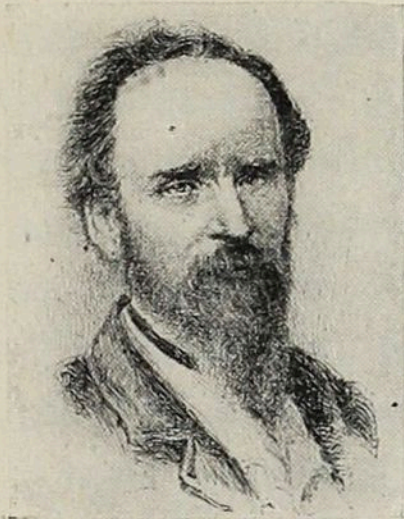
From such a tour of inspection and from the examination of such examples of the metal-worker's art, the householder returns to his rapidly completing dwelling with a renewed interest, filled with enthusiasm over the gems of art metal which have been spread before him; and the tasteful and beautiful appearance of the house, whose owner has completed it with such an appreciation of the possibilities of art metal work, will bear witness to the success which has attended the modern union of the Artist and the Artisan.





## Section 4.

### A Bit of History.



LINUS YALE, JR.,  
Inventor of Yale Lock.  
Died, 1868.

THESE are events in the history of the Mechanic Arts which are as epoch making as the achievements of soldiers or politicians in the history of a nation, and a bit of such history, relating to one of the industrial arts, is here briefly recorded.

Linus Yale, Jr., whose early ancestors were of the same family as the founders of Yale University, was born April 4th, 1821, at Salisbury, Herkimer County, N. Y., and, at an early age, began his career as a portrait painter, thus giving rein to his strongly marked artistic proclivities.

From his father, however, who was an inventor and maker of Bank Locks, he inherited mechanical tastes and aptitudes which proved to be even stronger than those which led him first to choose the vocation of an artist, and ultimately he turned his thoughts and work into the field of applied mechanics.

His earlier efforts in this field related almost exclusively to Bank safes and locks, and were so original and successful that he came to be recognized as the leading American expert and authority in these matters. As such he was employed, as consulting engineer, by many of the banks and bankers of that day, to design their more important safes and vaults, and to provide the locks needed in connection therewith. Of these he invented many, of diverse types and of most ingenious and complicated construction.



The combination lock, as now used, was then unknown, and all of Mr. Yale's earlier inventions related to locks operated by keys, but great security was obtained by making the "bit" of the key changeable at will and also detachable from the handle, so that, as the latter was rotated in the lock, the former was detached and carried away from the key-hole to a remote part of the lock and there brought into contact with the tumblers to set them in position to permit the bolt to move, the continued rotation of the key handle then operating the bolt and returning the "bit" to the key-hole for removal. The famous "lock controversy" which arose in England, during the World's Fair of 1851, when the American, Hobbs, succeeded in picking the best English bank locks, had its aftermath in similar contests between American bank lock makers. Being drawn into this, Mr. Yale first discovered how to pick the then celebrated Day & Newell "Parautoptic Bank Lock" (known in England as the "Hobbs" lock), but soon afterwards discovered also how to pick his own best bank lock, the "Double Treasury" lock, and ended by demonstrating that any lock having a key-hole could successfully be attacked by one having the necessary skill and implements.

Ultimately Mr. Yale turned his attention to the combination, or "dial" lock, which, in crude forms, had been known for centuries, and brought it to such perfection that, before his death, it had displaced nearly all other locks for bank use, and had substantially obtained what has since been demonstrated to be its final form. Shortly after his death a method was discovered whereby the best dial locks, as then made, could also be picked, but improvements in certain details were speedily devised which completely remedied this weakness, and these locks, as now made, are proof against picking by any methods thus far discovered.



In the thirty-five years which have since elapsed the "dial" lock has been in universal use in America for safes and vaults, but although produced in many forms and by many makers it retains to-day the essential characteristics given it by Linus Yale, Jr.

In 1860 to 1864 Mr. Yale made and perfected what subsequently proved to be his most important invention, and the one which was destined to give his name a permanent place in the roster of American inventors. This was the key lock now known throughout the world as the Yale Lock, and with which the public is so familiar as to render it a difficult task effectively to set forth the wide departure from all previous standards which it constituted, and the radical character of the improvements which it embodied. The United States patents covering this invention were issued to Mr. Yale on January 29, 1861 and June 27, 1865.

Prior to the invention of the Yale Lock the round key was in universal use, its size usually being proportionate to the size of the lock, and, of necessity, its length being proportionate to the thickness of the door. The weight and bulk of a bunch of keys of that day can hardly now be realized. Moreover, the locks themselves were usually of crude and rather bulky form, of indifferent security and of inferior workmanship. Many of them were imported, from England or Germany, and even the old "stock-lock," with wooden frame and sheet iron working parts, was still largely used in certain sections of the country.

Mr. Yale's inventions and improvements, which since have completely revolutionized the art of lock-making in America, and contributed greatly to place it in the position it occupies far in advance of that of all other countries, consisted of the following, viz.:



1. In removing the key-mechanism of the lock from the case which contains the bolt, and in enclosing it in a separate "cylinder," inserted from the face of the door and permanently connected with the lock case behind.

2. In combining the ancient Egyptian "pin-tumblers" with a revolving "plug" containing the key-way, thus obtaining with great convenience and moderate cost, greater security and greater capacity for key changes than any other system.

3. In combining, with the revolving "plug," a *flat key*, of convenient form and of uniform size for all sizes and kinds of locks, in place of the round key previously in universal use.

4. In the adoption of a standard of design and workmanship for key locks for general use equal to that previously employed only in the case of bank locks.

5. In resorting to the use of high-class machine tools to obtain the higher standard of workmanship thus established.

6. Finally, in consulting the convenience of buyers by packing each lock in a paper box, complete with all necessary trimmings and screws (instead of merely wrapping it, separately from its related trim, in paper, as was then and for a long time afterwards, the general rule of all other lock-makers) thus initiating the practice of packing locks complete in "Sets," which is now almost universal in the trade in the United States.

The final result was a radically new type of lock, of far higher security and mechanical excellence than had ever before been made, provided with a key of the smallest and neatest form, and susceptible of production by special machinery at a cost which has made it available for general use, especially whenever security is desired.

At this period Mr. Yale was operating a small factory at Shelburne Falls, Mass., the chief product of which was bank locks, although the manufacture of the flat keyed cylinder lock,



with pin-tumblers, had also been commenced in a small way, and, in addition was acting frequently as consulting expert in safe and vault construction. In the summer of 1868, Mr. Yale, who was thus engaged, and Mr. Henry R. Towne, then of Philadelphia, Pa., a much younger man, who had received a thorough training as a mechanical engineer and was seeking an opportunity of forming a permanent business connection, were introduced to each other by a mutual friend, with the result, after some months of negotiation, that a partnership was formed between them under which Mr. Yale agreed to contribute his existing business, patents and inventive skill, and Mr. Towne agreed to provide increased capital and to organize and manage the manufacturing department. It may be noted here that although Mr. Yale's business at that time related chiefly to the making of bank locks, Mr. Towne was attracted to it by the conviction he then formed that the newly-invented "Cylinder" lock contained the germ of a business of far larger dimensions and one which, if properly exploited, could be developed into a large industry.

By mutual consent the partnership thus arranged was organized, in October 1868, in a corporate form, under the name of The Yale Lock Manufacturing Company, and was located at Stamford, Conn., thirty-four miles from the city of New York, this point being carefully selected as combining the advantages of the skilled-labor market of New England with close proximity to the commercial metropolis of the country. A suitable site having been purchased, Mr. Towne went to Stamford to design and erect the modest factory building which was proposed, Mr. Yale continuing to conduct the existing business at Shelburne Falls pending its removal to the new location.

On December 25th, 1868, Mr. Yale, who had unexpectedly been detained in consultation over the plans for the vaults of the



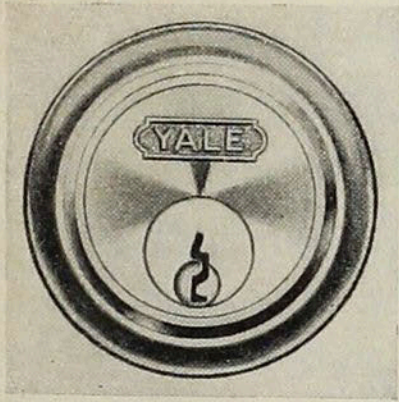
Equitable Building, then under construction, died suddenly of heart disease, (aged only 47 years) in the city of New York, leaving to the young enterprise, still in embryo, the heritage of his brilliant inventions, the latest and, as it has ultimately proved, by far the most important, of which was destined, through the world-wide popularity of the Yale Lock, to make his name a household word.

The subsequent history of the enterprise, whose infancy was thus clouded by the shadow of a great sorrow, is told in Section 7. It need only be added here that in 1869 Mr. Towne succeeded to the Presidency of the Company, and has since controlled its policy and directed its affairs. In 1882 it obtained a special charter from the state, and in 1883, because the original name had become inappropriate in view of the greatly enlarged and diversified line of products, the present corporate title, comprising the names of the two founders, was adopted, namely, The Yale & Towne Manufacturing Company.



## Section 5.

### The Yale Lock.



Yale Cylinder.

AS explained in the preceding section, the Yale Lock takes its name from its inventor, Linus Yale, Jr., whereas the numerous reproductions of its earlier forms which, since the expiration of the original patents, other manufacturers have put on the market to compete with it, have modestly been named after

one or another of the leading American universities.

Granting that "imitation is the sincerest form of flattery" the many imitations of the Yale Lock with which the market is supplied constitute the highest tribute to the unique character, excellence and popularity of the original.

As explained in Section 4, the first and most important element of the Yale Lock is the Cylinder, a front elevation of which is shown herewith and sectional views by Figs. 1, 2 and 3 on next page. It consists of a shell, or case, enclosing a revolving "plug" and containing a series of chambers to receive the "pin-tumblers" with their complementary "drivers" and springs. Extending longitudinally through the plug is the "key-way," and attached to its inner or rear end is the "cam" which, when the plug is rotated, engages with and operates the bolt of the lock.

Each "pin-chamber" is formed partly in the cylinder and partly in the plug, and each contains at its bottom a "pin" (on which the key acts), above this another pin, called the "driver," and above the latter a spring. Normally the several



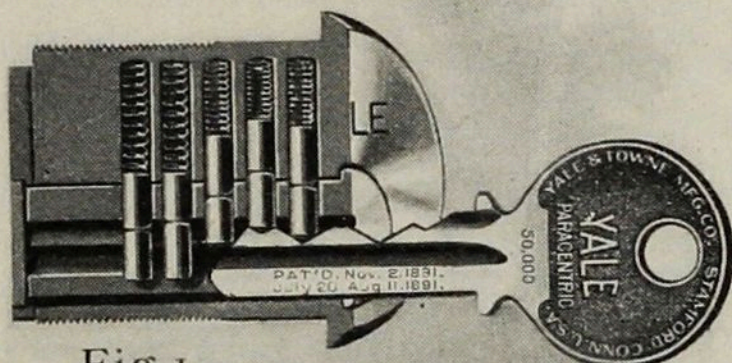


Fig. 1

FIG. 1. Cylinder with key partly inserted, illustrating the action of the key upon the tumblers.

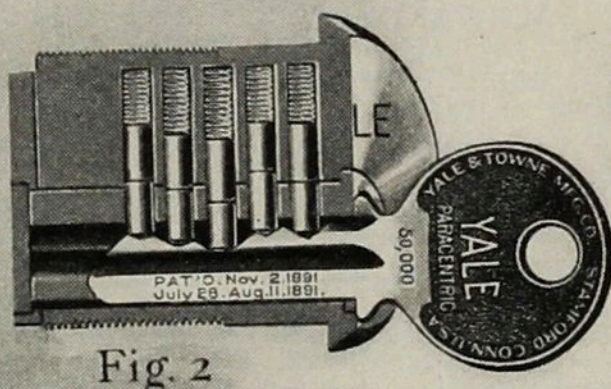


Fig. 2

FIG. 2. Cylinder with key inserted whose bittings do not correspond with the tumblers and which, therefore, will not actuate the lock.

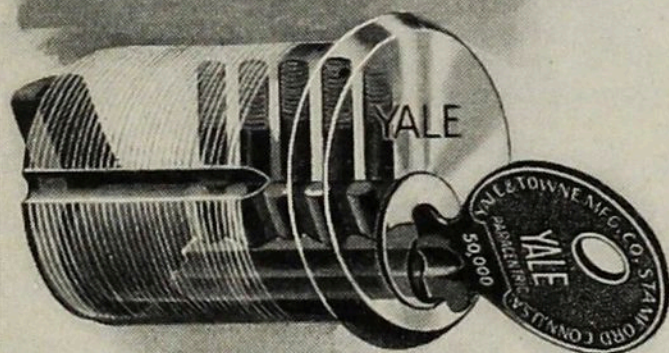


Fig. 3

FIG. 3. Cylinder with key fully inserted, showing operation of cam at rear, which actuates the bolt mechanism.

The Cylinder of a Yale Lock,  
Illustrating the Yale Pin-Tumbler Mechanism.

pins rest at the bottom of their respective pin-chambers, which latter intersect the key-way but do not extend quite to its lower limit. In this condition the plug is barred against rotation by the "drivers," each of which rests partly in the plug and partly in the cylinder, as seen in Figs. 2 and 3.

When a key is inserted its point passes under the pins, successively, and raises them so that they rest on top of the key. The insertion of the true key lifts each pin to a point such that the



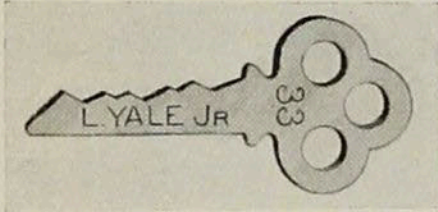
joint between it and its "driver" corresponds exactly with the joint between the plug and the cylinder. The plug is now free to rotate within the cylinder (see Fig. 3), the *pins* traveling with the plug and the drivers remaining stationary in their respective chambers. If any but the true key be inserted, however (see Fig. 2), the pins will not be lifted to the proper points, and the plug will still be barred against rotation. As the number of the pin-tumblers is usually five, and as a variation of *one-fiftieth* of an inch from the proper height will cause any tumbler effectively to prevent rotation of the plug, it will be seen that the Yale Lock possesses a high order of security and a vast capacity for key-changes or "combinations."

The invention of the rotating "plug," with its contained "pin-tumblers," carried with it and made possible the employment of a flat but rotative key. In designing this Mr. Yale adopted the *trefoil* form for the bow or handle of the key, his original form of key being shown by Fig. 4, and for many years this peculiar design was used only with the Yale Lock, and thus became generally identified with it, so that, in time, *every lock* with a flat key, especially if the bow of the key had the trefoil shape, was popularly supposed to be a Yale Lock, although a vast number of cheap and insecure locks, not of the "cylinder" type, having keys of flat metal and with trefoil-shaped bows, were made and sold. Unfortunately, this error still persists, being often encouraged by unscrupulous dealers, and thousands of bogus locks are palmed off annually as genuine Yale Locks on customers who are too little informed, or too careless, to detect the fraud by noting the absence from the goods of the name and trade-mark of the sole makers of the genuine Yale Lock, The Yale & Towne Manufacturing Company.

As the popularity of the Yale Lock grew and the demand for it increased, the experts of the Company, finding that the



original construction, although affording great capacity for key changes, permitted the lock easily to be attacked by proper picking tools in the hands of an expert, devised and adopted a radical



Original Yale Key.  
Fig. 4.

improvement. This consisted in corrugating the blade of the key (see Fig. 5), thereby making it stronger and far more difficult to duplicate, and in forming the sides of the key-way with reverse corrugations, conforming to and inter-

locking with, those of the key. Several very marked advantages resulted from this improvement. It prevented the tilting of the key in the cylinder, which had been a fault with the flat key; it greatly increased the resistance of the lock to picking; it added further security by making it far more difficult to obtain duplicate keys illicitly; and, finally, by beginning a new series of locks, with a key of distinctly different form from the key of the original series, it precluded all possibility of locks of one series being passed by keys belonging to locks of the other series, a most desirable result in view of the vast number of Yale Locks with flat keys which were then in use.

The corrugations of the key just described approach, *but do not pass*, the axial line of the key-way, as will be seen by cut on page 77, and it was found that, by using picking tools of great delicacy, it was still possible, although difficult, for an expert to pick the lock. A long series of experiments was then undertaken which resulted in the development and the adoption, about 1892, of the type of key now used with all of the genuine Yale Locks. This great improvement, which is the culmination of the long series of brilliant inventions embodied in the Yale Lock, embodies a distinctly new principle, to designate which the name "Paracentric" was coined and adopted. The Paracentric principle, (see page 77) consists in constructing



the key-way with continuous longitudinal barriers (in planes perpendicular to the motion of the pin-tumblers), projecting from opposite sides of the key-way *past its centre, or axial line*, and interlocking so deeply as practically to preclude the use of picking instruments to operate vertically on the tumblers. The result is the *greatest security* possessed by any key-lock adapted to practical use. The Paracentric key must necessarily coincide accurately with the cross-section of its *key-way*. As its form is patented, and it can only be produced by expensive special machinery, of great accuracy, it affords the highest attainable degree of protection against the illicit duplication of keys, and, as in the case of the Corrugated key, it marks the commencement of a new series of locks, the keys of which are non-interchangeable with the locks and keys of either of the preceding series.

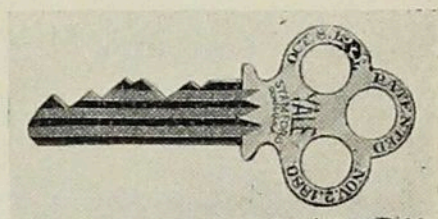


Fig. 5.  
Yale Corrugated Key.

The illustrations on Page 77 show the several forms of key-way referred to in the foregoing description, and also those commonly used in other "cylinder locks," made in imitation of the Yale Lock, and simulating the "Paracentric" in *appearance*, but not in *security*. These latter also have projections or "ribs" on one or both sides of the key-way (in some cases, however, only extending a short distance from its front end), but as the Paracentric patents forbid their projection beyond the centre line, they offer small obstruction to the use of picking tools, and afford little more security than the original lock with flat key. Their characteristics can readily be detected by examining closely the form of the key-way of any lock of the Yale type in which they are used.

The impression prevails quite generally that the Yale Lock cannot be picked, but this belief is contrary to the fact. *No lock*



with a key-hole has ever been made which is unpickable. Mr. Yale demonstrated this by devising instruments with which he picked the most elaborate bank locks then in use (about 1860), first the celebrated Hobbs' lock, and later his own still more intricate "Treasury" Lock, and it was the discovery of this fact which caused him to abandon the use of locks with key-holes for

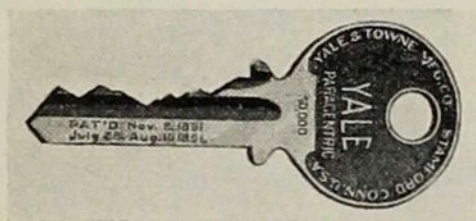


Fig. 6.

Yale Paracentric Key (Obverse).

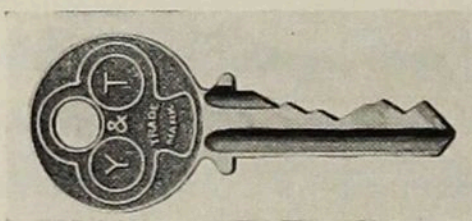


Fig. 7.

Yale Paracentric Key (Reverse).

Bank protection and to develop and perfect the combination or "dial" lock. All that its makers claim for the Yale Lock is that, as now made, it is more secure and more difficult to pick than any other in use, and that the operation of picking it is so difficult, and requires such expert knowledge, skill and tools, as to make it absolutely secure against any attack to which practically it is exposed, this statement being justified by an experience of twenty-five years, and by the record of many millions of Yale Locks in use.

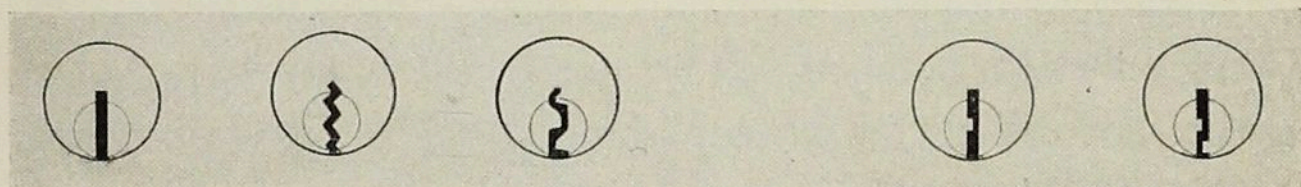
Another popular fallacy consists in supposing that "no two Yale Locks have keys alike." Obviously the number of variations or "key-changes" which are possible with any given form of key is definitely limited by the physical conditions. As a matter of fact, most of the common inside door locks in use have only *four* key-changes; that is, a set of four different keys will pass all locks of a different type, or, conversely, each key will pass one out of every four locks.

Few such locks, even of the better grades, have more than twelve, or at most thirty-six, key-changes. Not long ago a house-to-house examination of the locks and keys on the front



entrance doors of the houses in *one block* in the up-town residence section of the city of New York disclosed the fact that more than ten of the locks could be passed by the same key ; in other words, ten householders had free access to each other's houses !

In the case of the Yale Lock, in its standard form, the num-

Original Flat  
Key-way.Corrugated  
Key-way.Paracentric  
Key-way.Single Rib  
Key-way.Double Rib  
Key-way.

GENUINE YALE LOCKS.

IMITATIONS.

ber of key-changes theoretically possible is 100,000, but practically this is reduced, by throwing out keys of undesirable form or those too nearly similar, to 27,000. The changes or "bittings" thus selected for use are recorded in printed lists, and the latter are carefully followed in manipulating the machines which produce the keys, so that the *entire series* is used before any of the changes are repeated, but it is obvious that there is a chance, in the ratio of 1 to 27,000, that the keys of two Yale Locks may interchange. The difference between this ratio and the ratio of 1 to 4, 12, 24 or possibly 36, existing in common locks, is a fair measure of the vastly greater security of the Yale Lock against accidental interchangeability of keys.

Each of the key-changes is numbered consecutively on the printed lists just referred to above, from No. 1 upward, and, for convenience in manufacture, the keys are numbered correspondingly. Hence it follows that it is practicable to furnish duplicate keys *by number*, but the invariable rule has been, from the outset, not to do this but to require, *in all cases*, that one of the original keys (or else the lock itself, or its cylinder) must accompany every order for duplicate keys, in evidence of the right of



the party giving the order to have the key or keys called for. This policy is regarded as of *vital importance* to the security and protection of all users of the Yale Lock, and will permanently be maintained. The contrary policy, pursued by some other manufacturers, of furnishing duplicate keys *by numbers*, makes it feasible for any evil-disposed person to obtain keys to locks belonging to another by ordering them, by number, from the maker, providing only such numbers can be ascertained in any way, a thing usually not difficult of accomplishment. This highly dangerous practice tends seriously to impair the value and reliability of locks made by the manufacturers who adhere to it.

It has been mentioned above that Mr. Yale had adopted the *trefoil*, or clover leaf, bow for his original lock, and that for many years it was associated exclusively with the Yale Lock and thus became accepted as a mark of identification. Ultimately, however, other lock makers copied the trefoil key-bow, presumably to promote the sale of their goods by misleading purchaser of them.

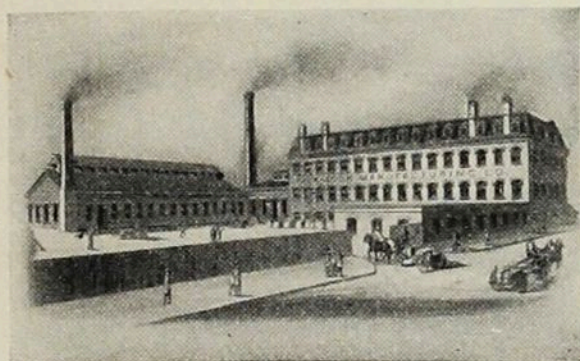
Desiring to maintain the individuality which has always characterized every detail of the Yale Lock, its makers have recently discarded the trefoil bow in connection with the Paracentric Locks, substituting therefor the new design shown by Figs, 6 and 7, on page 76, which, in a bow of round form, embodies the Company's well-known trefoil trade mark, although continuing to use the trefoil bow for locks of other types.





## Section 6.

### Story of an American Industry.\*



Stamford Factory, 1873.

THE Yale & Towne Manufacturing Company came into existence in October, 1868, as explained in Section 4, at which time a site was purchased at Stamford, Connecticut, 34 miles from the

City of New York, and the erection of a small building begun. That building, with some additions made in 1873, is shown by the accompanying illustration.

In this building the business was started, in March, 1869, with about thirty employees, a salesroom being established simultaneously at No. 1 Barclay Street, New York. At that time Bank Locks formed the principal product, the remainder consisting of the then new and little-known pin-tumbler lock, now universally known as the "Yale Lock," of which only seven varieties had then been designed and made, viz: a store door lock, a rim and a mortise night latch, a cupboard, a chest, a desk and a drawer lock.

The enlargement of this line, and the creation of a market for it, were from the outset the chief objects of the management. Among the additions of the first few years were safe deposit locks, several forms of mortise locks, and a front door lock, the latter embodying the novel feature of operating both bolts by the same key and through a single key-hole. Just previous to his death Mr. Yale had designed a lock box, with

\* The insertion of this article is due to the fact that so much friendly interest has been shown in previous publications relating to its subject-matter as seemingly to justify its reproduction here in a more complete and connected form.



pin-tumbler lock, for the post office in Boston, Mass., and this system was now successfully developed, the rapid adoption of the Yale Lock Box in post offices in all parts of the country helping greatly to call public attention to the merits of the Yale Lock, with its diminutive and then novel key. Success in this field led shortly to the designing and building of complete post office "Equipments," including the necessary woodwork, and the industry thus initiated has since constituted one of the important departments of the business. During these early years, also, the line of Bank Locks was entirely remodeled and much enlarged, and the growth of the business was such that, by 1872 the number of employees had increased to about 150.

In 1873 the first decisive step was taken toward broadening the company's operations by the purchase of the good will, business, patterns and tools of another small manufacturing concern producing a line of *bronze hardware*, and the company thus entered a field in which it was destined later to achieve one of its most notable successes, and to become largely the creator, and concededly the leader, of a new and important industry.

In 1875 another line was added, but one extraneous to Builders' Hardware. This was the Weston Differential Pulley Block, a portable hoisting device of very original and useful construction, which has since gone into world-wide use. An exclusive license under the American patents of Thos. A. Weston was obtained, and their validity established by successful litigation, four infringing competitors were bought out, and a control of the business established which was complete during the life of the original patent, and has since been practically effective, this department, thus becoming an important and permanent feature in the Company's business. As an outcome of this undertaking the Company was led, shortly afterwards, to embark in the business of designing and building cranes, of all



kinds and sizes. In this field of engineering it was distinctly a pioneer, being the first to recognize that, in America as in Europe, cranes would surely become an important element of machine equipment, and was the first to organize for their production. For this purpose a special engineering staff was organized, a large building erected and equipped with the proper machinery, and the business thoroughly established on a large scale, the value of its product, while continued, exceeding \$1,000,000. This product, however, was wholly distinct from those of the other departments, and its heavy character, together with the fact that the chief market for it was found in the Central and Western States, made Stamford an unsuitable place of manufacture, and led ultimately to the decision to dispose of the business. Accordingly it was sold, in 1894, to The Brown Hoisting Machinery Co., of Cleveland, Ohio, by whom it is now carried on, the Chain Block business, however, still being retained at Stamford, and having been largely developed.

In 1882 another engineering enterprise was undertaken, based on a series of patents granted to A. H. Emery, C. E., and relating to a new and highly organized system of testing-machines and heavy scales, possessing greater accuracy than any previous machines for like purposes. In this case, also, Stamford was found to be unsuitable in location for a heavy engineering product, extraneous to its surroundings, and in 1887 this business was sold to William Sellers & Co., of Philadelphia, Pa., by whom it is still continued.

The Crane and Testing-machine Departments, both involving engineering work of large and heavy construction, thus being eliminated, the efforts of the management were concentrated on the earlier and more important lines of product, the growth of which has since fully occupied its abilities and resources.

Resuming the narrative of these, it may be mentioned that



in 1876, in response to the demand created by the occurrence of numerous robberies of banks, in which officials, under torture or threat of death, were compelled to disclose the combinations of locks under their control, the Yale Time Lock was invented and put on the market, its action being dependent on fine chronometer movements, and not controllable from the exterior of the safe to which it is applied. At first bankers showed great timidity in adopting a device which depended on clockwork to release the heavy doors of burglar-proof safes and vaults, but this natural hesitancy soon disappeared as experience demonstrated that the new Bank Lock not only gave the desired protection but also was thoroughly reliable in action, and a Time Lock is now regarded as an indispensable element in the security of every American banker's safe or vault. In evidence of this it may be mentioned that more than six thousand Yale Time Locks are now in daily use, chiefly in the United States, but some also in other countries.

In 1878 the position of the Company was strengthened by the purchase of two smaller competitors (The United States Lock Co. and the American Lock Co.) both making lines of locks which had become somewhat competitive, and at about this time it began the production of padlocks, of which it now manufactures a very extensive line, constituting an important department of the business. By this the number of employees had increased to about 300. Branch offices had already been established in Philadelphia and Boston, and one was opened in Chicago in 1880. Additions to the plant at Stamford were made almost annually, as the business steadily grew in dimensions, those of 1881 and 1883 being exceptionally important, and the machine equipment was constantly improved by the addition of machine tools of the latest and best construction, many of them from special designs furnished by the Company.



About 1882 began the demand for a new and distinctly higher grade of Ornamental Hardware, conforming intelligently to traditional schools and based on the accepted rules of ornament, the rise and progress of which has already been narrated in Sections 1 and 2, to which the Company responded with such promptness, efficiency and enthusiasm as to justify the statement that it led, rather than followed, the movement. It sought and obtained the cöoperation of leading architects, and, thus aided, brought out in rapid succession a series of designs which were a revelation of the possibilities of this long-neglected field of applied art, and many of which are still in active demand. For the proper exploitation of this work it organized an Art Department, under trained designers, with draughtsmen, modelers, chasers and every possible facility for fine metal-working, including a chemical laboratory and, later, a photographic establishment.

At that period nearly all fine hardware was made of bronze, cast iron being rejected as an inferior and unsuitable material. Holding a contrary view, the Company sought to restore iron to its historical position as one of the noble metals, and one eminently suitable for purposes of decoration. In this effort it secured control, for such purposes, of a then recent invention by two Englishmen, Messrs. Bower and Barff, for treating iron so as to make it rustless; and a little later of an American invention, by the late R. A. Tilghman, known as the "sand blast," whereby it became possible to produce a new and beautiful finish on metallic surfaces. Both of these processes are now public property and are in general use, but the Company expended much time, effort and money in adapting them to these special uses, and can justly claim to have discovered their availability in this field, and to have established their popularity. It has an equal claim to having been the pioneer, and for several years the only worker, in the field of high class artistic hardware, as the



term is now understood, and to this day its long series of designs, in fine hardware of every kind, holds concededly the leadership over all competitors, not only in priority of origin but in artistic character, extent and high standard of execution. The importance and activity of this department have increased steadily from year to year and are greater now than ever before.

In 1891, although the number of employees had then increased to over 900, the Company made preparations to add another product to its already large business. This consisted of a complete line of Cabinet and Trunk Locks; that is of every kind and size of lock required by furniture manufacturers and trunk makers, as it had for some time been making every kind of lock required by safe makers. The line of goods thus involved is a very extensive one, and the preparations for its complete production occupied several years.

Prior to 1894 the Company's line of Builders' Hardware, including locks, comprised only the finer and more expensive grades, its customers drawing their necessary supplies of the commoner and cheaper goods from other manufacturers who made the latter but not the former grades. It had become obvious, however, that this division of the business was not permanent, and that competitors were not content to make only the inferior grades of goods but were already beginning to follow the Company's lead by undertaking to produce fine goods also, in many cases patterning them closely upon its models and style, although rarely attaining to its high standard of quality. In view of this change in trade conditions it decided to further extend and complete its own line by arranging to produce all of the cheaper varieties of locks and hardware demanded by the trade, and thus to be able to supply its customers with *everything* required in the line of Builders' Hardware.

This purpose was effected in 1894, by the purchase of the



entire property, good-will and business of the Branford Lock Works, of Branford, Conn., with a capacity for the employment of over 500 persons. The Branford line was one of the oldest, best known, and most extensive in the trade, and embraced a complete assortment of Builders' Locks and Hardware of the cheap and medium grades. Recognizing that the demand for these goods is not only very large, but also as legitimate and permanent as that for fine goods, the Company then proceeded to remodel and improve the Branford line, intending to make it the best of its kind in the market, and to incorporate in it every improvement suggested by experience in similar products of higher grade which was consistent with the necessary condition of economy in cost. This was duly accomplished, thus merging these goods with the Company's original product and making its line of Builders' Locks and Hardware the best and most extensive in the world, embracing every grade of goods, from the cheapest which are fit for use to the finest and most expensive.

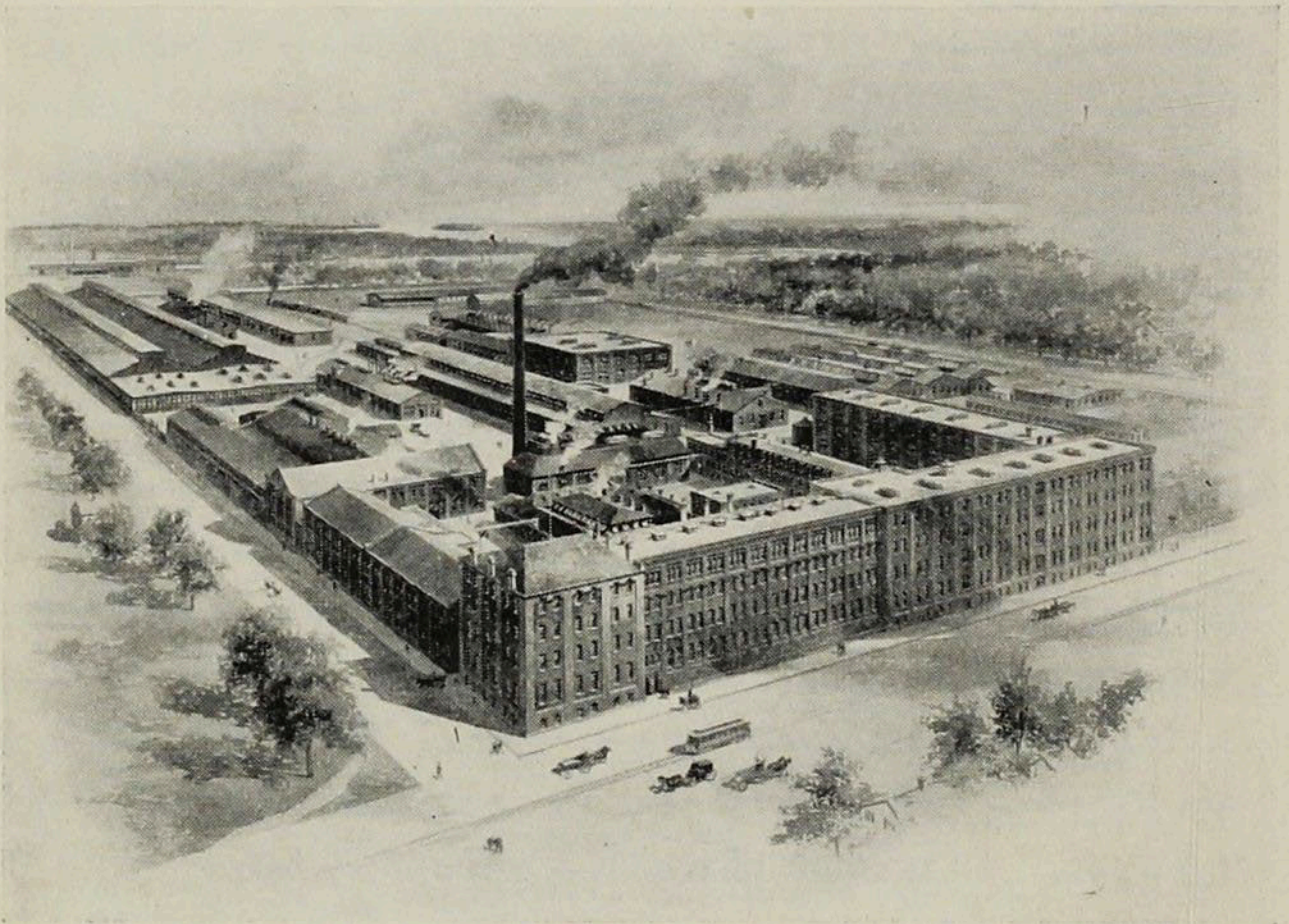
Impressed by this experience with the importance of goods of medium grade, that is of good quality and moderate cost, the Company next gave special attention to strengthening its line in this direction, bringing out many new goods of this grade. Included among these was a complete line of Builders' Locks made wholly of *Wrought metal* and designated by the trade name "Vulcan," an account of which is given elsewhere.

As explained elsewhere, the device known as a Door Check has become an important article of hardware equipment, and in 1895 the Company acquired control, by purchase from the Blount Mfg. Co., of the inventions and patents relating to the Blount Door Check, a combined door spring and check of the liquid type, which had already acquired a recognized position as the best device of its kind yet produced, the manufacture of which now constitutes one of the important departments of the business



and occupies a large building devoted exclusively to this purpose.

Having thus fully occupied its chosen field of operation the Company, in 1899, issued a new edition (No. 17) of its trade catalogue, embracing all of its various and extensive products. This is a folio volume of over 900 pages, each 9 by 12 inches, illustrating, describing and pricing the entire line, and designed for use by trade customers. The vast extent of the line is indicated by the fact that upward of 120,000 prices are quoted in this volume.



Stamford Works, 1903.

During the year 1900 it was found that further enlargements of the plant at Stamford were needed to accommodate the increasing volume of business, and it was decided, in making these, to provide accommodation also for the business theretofore carried on in the Branford plant, and thus to consolidate all manufacturing operations at one point. Plans were made accordingly, and early in 1901 contracts were placed for the erection of the pro-



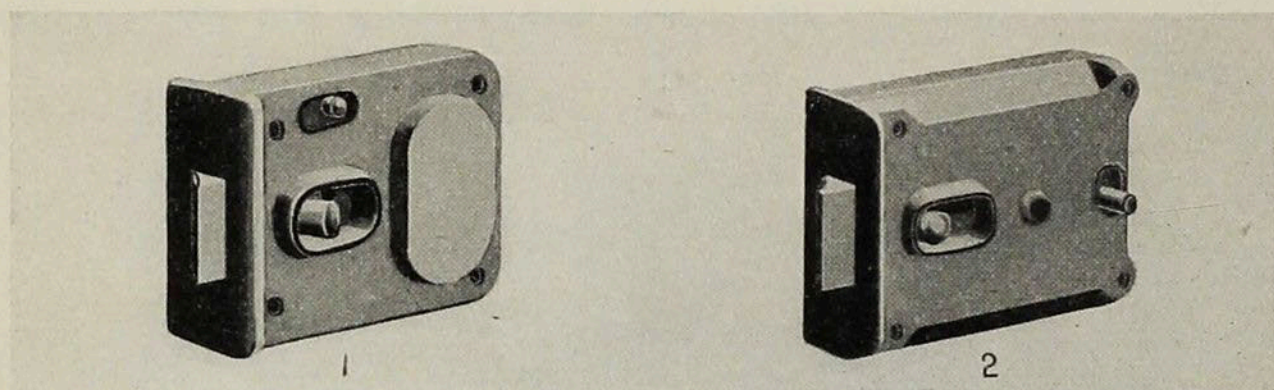
posed new buildings and for the necessary machinery and other equipment. These extensive improvements are now completed, giving the Stamford Works a capacity for the employment of upward of 3,000 persons, and making them the largest and best equipped of their kind in the world. They occupy an unbroken tract of over 15 acres of land, with direct rail and salt-water connections, within the city of Stamford, closely adjacent to the railroad station, and only 34 miles from the city of New York, with hourly trains each way making the trip in fifty minutes.



## Section 7.

### Evolution in Lock Designing.

**A**MERICAN locks have always been attractive in external design, as well as excellent mechanically. As an example of development in design the accompanying illustrations may interest those who like to trace the process of

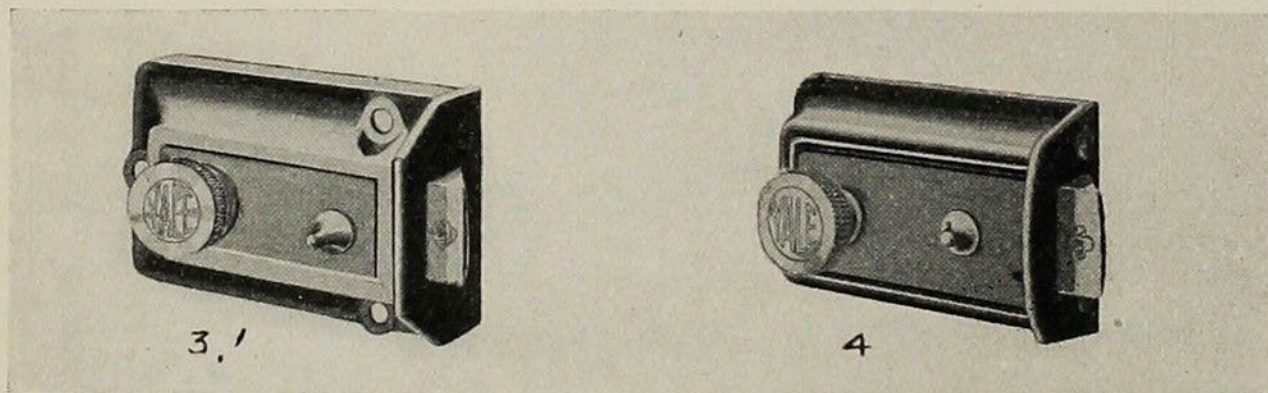


Original form, about 1867.

First modification, about 1870.

evolutions in industrial art. They show the Yale lock, in its most popular form, the Yale Rim Night Latch No. 42, known and used all over the world, in its several stages of evolution from the original to the latest design.

A similar evolution has occurred in all kinds of builders' locks and hardware, the American product of which unquestionably excels all others in external appearance as well as in mechanical excellence.



First successful effort to attain graceful lines, about 1871.

Latest design, adopted in 1879.



## Section 8.

### Historical.

THE history of the art of the locksmith is probably as old as the history of civilization, and references to it are found in the early literature of almost every nation.

Wherever and whenever property became individualized it is reasonable to suppose that means were desired and were devised for insuring its protection and privacy, and that thereupon locks in some form, however crude, came into existence.

To summarize, even briefly, the many records of the early phases of the art which are available would carry us far afield and entirely outside of the purpose of this volume, which aims merely to record the modern development of the art in the United States and to furnish technical information relating to it which will be of interest and use to the practicing architect, and perchance to his discriminating clients, and to the builder who uses and the dealer who handles the infinitely diversified product known as Builders' Hardware.

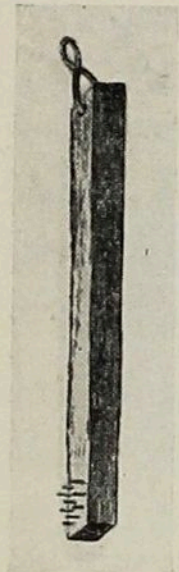
Those who are curious on the subject are referred to the generally excellent articles to be found in the larger encyclopedias and to the sources of information therein noted, and especially to a volume entitled "A Treatise on Fire and Thief Proof Depositories and Locks and Keys" by Geo. Price, published at London in 1856.

Not wholly to pass over the subject, however, we quote from the "Art Journal" of Messrs. D. Appleton & Co., an interesting historical sketch, giving also illustrations of some old locks and keys :



“The history of labor is the history of civilization, the scale of the progress accomplished, and the foreshadow of all future improvement. In no other way can a thorough knowledge of our own civilization be acquired than by looking back at the path mankind have passed over, and by examining all the footprints they have left behind.

“It is impossible to ascribe to any certain epoch and person the invention of working in metals; it dates, however, from the prehistorical times, and all the oldest mythologies have a divinity to which it was attributed. Tubal-Cain of the Hebrews, and Vulcan of the pagans, seem to be only one myth, and the reproduction of old Hindostanic traditions.



No. 1.

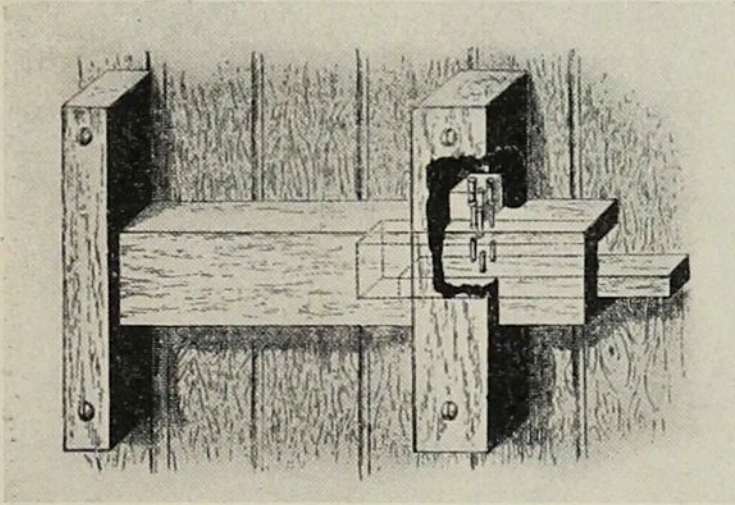
“It is an accepted opinion that the art of the smith has its root in the right of property. As soon as the idea of *meum* and *tuum* entered the human mind, say the majority of writers, just so soon were the contrivances of this art called into requisition. We think, however, that its origin can be traced further back to an earlier age of the world, and to another cause. It is evident that, to provide against the attacks of wild beasts, man must have secured the entrance of the cave or hut in which he dwelt by some means or other. However rude, those manifestations of man’s ingenuity foreshadow the contrivances applied later on to secure property. Wood was undoubtedly the first material employed in their construction, and very likely they were at first simple wooden bars and bolts. In fact, such is even at the present day the means by which many tribes of savages fasten their doors. Wood seems to have



No. 2.



long filled the office of copper, brass and iron, even among civilized nations; the *basso-rilievos* of the great Temple of Karnac prove that the Egyptians used wooden locks even when they were at the height of their civilization. M. Bonomi actually found in the ruins of Nineveh a wooden lock which appears to have secured the gate of an apartment in one of the palaces of Khorsabad.



No. 3.

It is the oldest lock yet discovered. 'At the end of the chamber, just behind the first bulls,' he says,\* 'was formerly a strong gate of one leaf, which was fastened by a large *wooden lock*, like those still used in the East, of which the key is as much

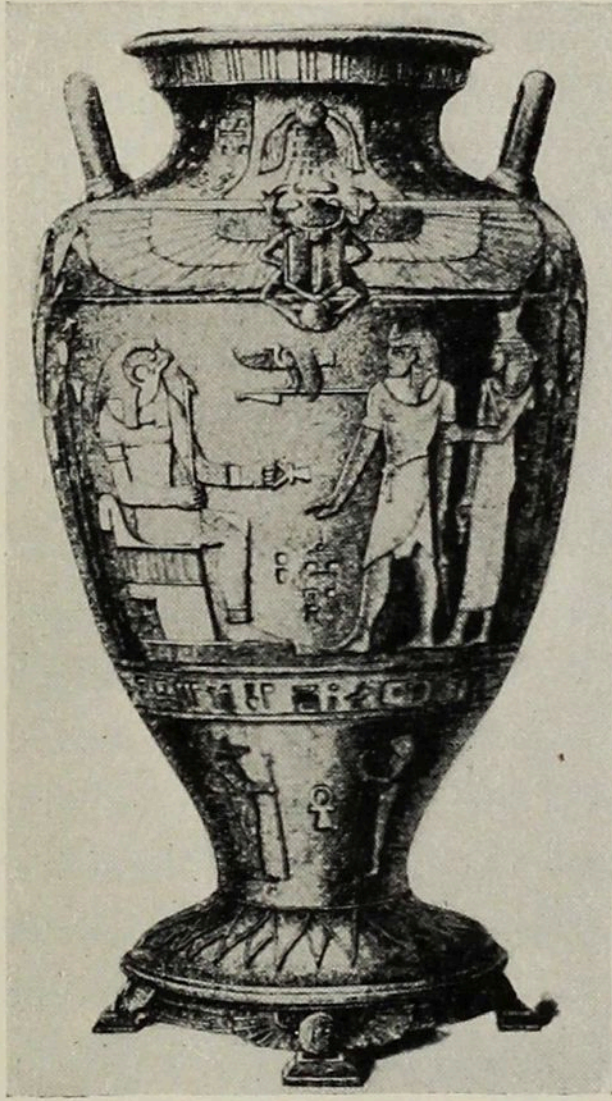
as a man can conveniently carry, and by a bar which is moved into a square hole in the wall. It is a key of this description that the prophet probably alludes to: 'And the key of the house of David will I lay upon his shoulder.' And it is remarkable that the word key (*muphta*), in this passage of Scripture, is the same in use all over the East at the present time. The key of an ordinary street door is commonly thirteen or fourteen inches long, and the key of the gate of a public building, or of a street or quarter of a town, is two feet and more in length.' Cut No. 1 shows this kind of key, and No. 2 the mode of carrying it alluded to in Isaiah, and as practiced still in the East. No. 2 in fact represents a modern merchant of Cairo carrying the keys of his magazine, as given by Mr. Price in his work on locks and keys. The iron pegs at one end of the wooden key correspond to so many holes in the wooden bar or bolt of the lock, which, when

\* Bonomi's "Ninive e i suoi Palazzi,"



the door is shut, cannot be opened till the key has been inserted, and the impediments to the drawing back of the bolt removed by raising up so many pins that fall down into holes in the bar or bolt corresponding to the pegs in the key. From a letter by

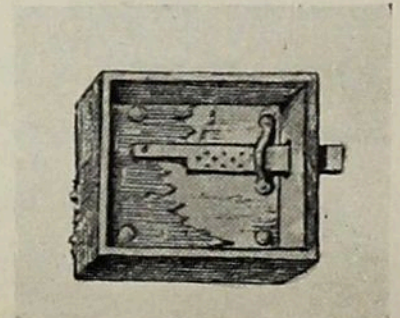
W. C. Trevelyan, which appeared in the *Journal of Design and Manufactures*, for July, 1850, it appears that similar constructions are still in use in the Faroe Islands, as they have probably been for centuries.



No. 4.

“Strange as it may seem, the principle on which this Egyptian lock is founded is almost identical with that of the modern lock of the most approved construction. By what process the Egyptian smiths arrived at the conception of such ingenious mechanism is unknown; at any rate, it supposes the previous existence of simpler

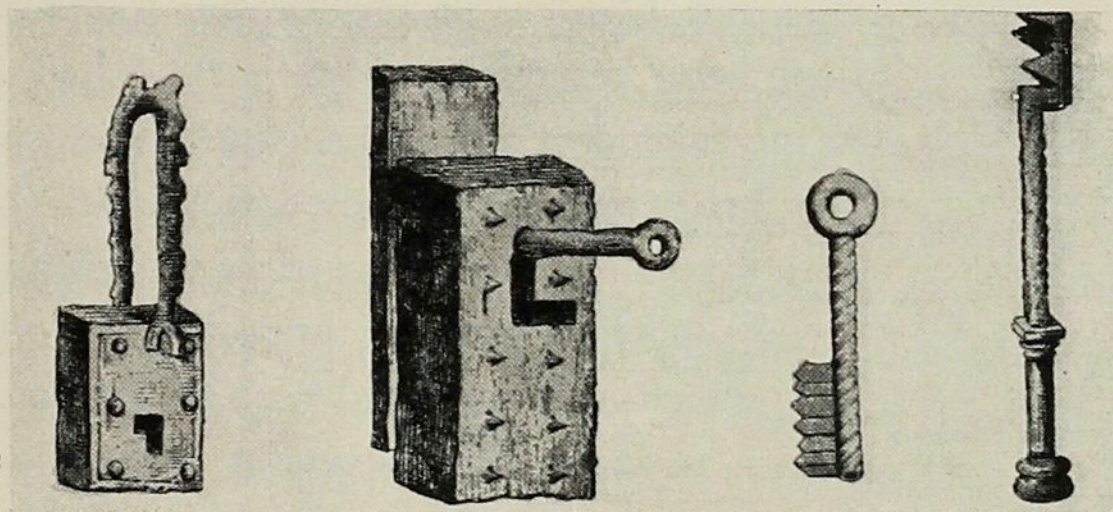
forms, for the law that bids man pass from the simple to the complex is the ruling law of mental development, and the more we go back toward the primitive ages of the world the slower is the improvement. Of how many centuries of patient labor was this lock the result, cannot be told. In cut No. 3, which is copied from a wooden lock lately brought to England from Alexandria, and now in the possession, we believe, of Mr. Chubb, of



No. 5.



London, we have, as nearly as can be expected, the whole secret of the modern patent locks, and we deem it not amiss to give a



No. 6.

No. 7.

No. 8.

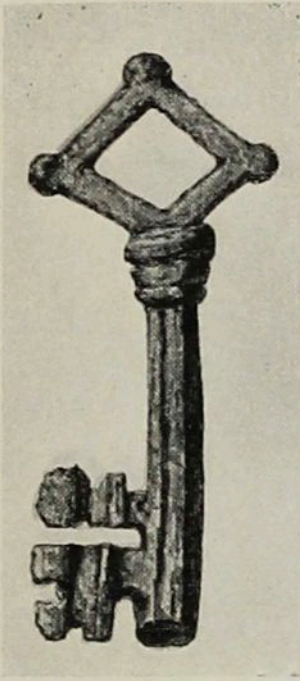
No. 9.

brief description of it.\* The right-hand staple is fixed in the side of the door; the cross-piece is the bolt, the projecting piece at the right is the key. Into the upper part of the staple are fitted three loose pins, which drop into three corresponding holes in the bolt, so as to fasten the door when the bolt is pushed in to its full extent. The key is a straight piece of wood having at one end several pegs, corresponding in position with the movable pins or tumblers in the lock. This key is inserted lengthwise through the slat or hole formed in the bolt, and then the pegs in the key, corresponding with the vertical holes in the bolt, into which the movable pins have dropped, lift up the pins, flush with the upper side of the bolt, and allow it to be moved backward or forward, to fasten or unfasten the lock. Now it would appear that no other key than the one made for this lock could have disengaged the bolt; because, from the movable pins being of different lengths, it follows that the pegs in the key must have been of corresponding height, and that, if any of the pegs in the key were too long or too short, they would not free the bolt.

“The Egyptians, however, appear to have at an early date

\* For all mechanical explanations that may be found in this sketch, we are indebted to the kindness of Mr. Frederic Voss.



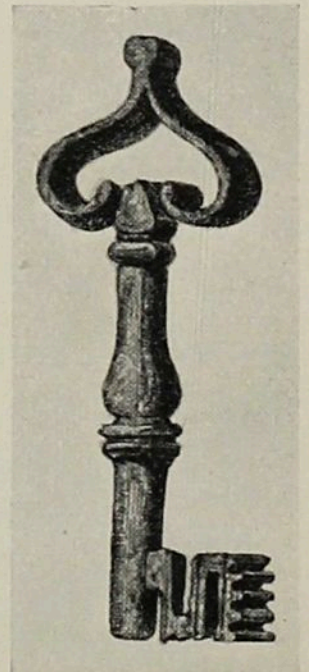


No. 10.

applied also brass and iron to the construction of locks and keys. Wilkinson, in his 'Manners and Customs of the Ancient Egyptians,' describes a key made of iron, which he found in the ruins of Thebes, and which had a shank five inches long, the handle being made by a loop at one end, while the other was turned at a right angle to form the operative part of the key, which was furnished with three teeth or points, to fit into corresponding cavities in the lock.

“We learn from Mr. Parkhurst's 'Hebrew Lexicon,' as quoted by Mr. Chubb and by Mr. Price, that certain crooked keys, having ivory or wooden handles, were used by the Hebrews and by the Greeks for the purpose of bolting or unbolting locks. Yet, before the Greeks knew anything about iron keys and locks, they fastened their doors and cabinets in a peculiar way, of which there is no record of its having ever been used by other nations. They fastened them with knots very difficult to be untied by any one but the person who had made them. In the eighth book of the 'Odyssey,' Ulysses is represented securing the rich presents of Alcinous and his queen, by a cord or rope fastened in a knot 'closed with Circean art.' This knot of Ulysses became a proverb to express an insoluble difficulty, and the Gordian knot is a proof of the estimation in which the ancients held this art, so necessary in the absence of locks.

“The locks that modern Greeks still use, particularly in the mountains, where so many of the ancient customs and traditions are preserved,



No. 11.

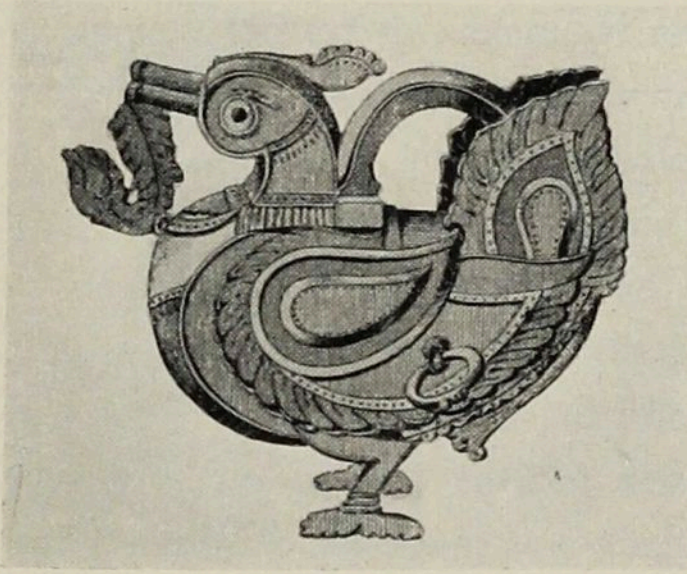


seem to point to another equally primitive manner of fastening doors. These were closed from inside by a bar, either of wood or of metal, attached to the door by means of leather strings or small iron chains. The keys by which these bolts were lifted up were made in the shape of hooks or sickles, either of wood or iron. So simple were these contrivances that any hook could open nearly every door; thus the Greeks had no difficulties in robbing each other. It is easily imagined that such a state of things could not last long; and the Greek ingenuity, that was never amiss, soon provided better for the security of property. The so-called Lacedæmonian lock was invented. When Pliny and Virgil speak of Theodorus of Samos as the inventor of locks and keys, it is perhaps in reference to the Lacedæmonian lock that their words possess a certain amount of historical truth. In time this specimen of fastening was improved by the insertion of the bolt in an iron frame or rim, which was permanently attached to the door by a small chain; but such a confusion is made by all the writers in describing the manner in which this lock worked, that we have been actually unable to find out what they meant.

“Keys seem not to have been reduced in size by the Greeks. Homer tells us (*‘Odyssey,’* xxi.) that Penelope, wanting to open a wardrobe, took a brass key very crooked and hafted with ivory. On this passage Eustathius, the Greek commentator of the *‘Sovereign Poet,’* remarks that this kind of key was very ancient, and different from the keys having several wards, which have been invented since, but that they were in use even in his own time (1170). They were in the shape of sickles, and, not being easily carried in the hand on account of their size and inconvenient form, they were usually carried according to the Egyptian style. Callimachus, in his hymn to Ceres, says that the goddess having assumed the form of Nicippe, the priestess,



carried a key fit to be borne on the shoulder. That keys with a kind of ringed handle were known to the Greeks, is further



No. 12.  
Hindoo Lock.

proved by a passage of Aratus. In order to give his readers an idea of the figure of the constellation Cassiopeia, he compares it to a key, and Huetius states that the constellation answers indeed to such a description, the stars to the north composing the curved part, and those to the south the handle.

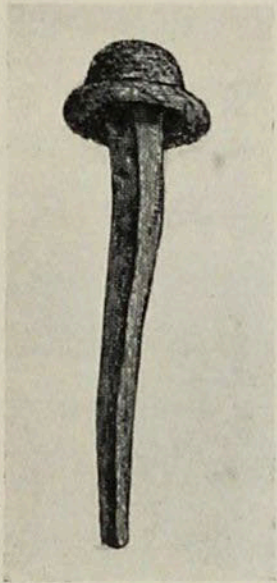
“Among the nations of antiquity, lock-making made little progress in advance of what had been done by the Egyptians. Even the Romans, who excelled the other nations in iron-work, used very simple locks, which resembled those of the modern Greeks. For a long time these contrivances were not nailed to the doors, and to open them it was sufficient to insert a jack into the staple and shake it; hence Ovid wrote, ‘*Escute forte seram*’ (‘Shake the lock hard’). Varro and Nonius also speak of this kind of locks as being mere padlocks. In the excavations executed in 1853, at Pompeii, in presence of the Imperial Princess of Russia, were, however, found a number of locks and keys which are improvements on anything previously made, as will be seen in our cuts Nos. 5, 6, 7, 8 and 9. The simple construction of No. 5 announces its greater antiquity; the bolt is of brass, and was evidently intended to move up and down a staple, on the lever principle, and to close by falling in a hasp fixed in the frame of the door. No. 6 marks a step further in the art of lock-making. It is an iron padlock with a brass handle, very much corroded by age; the frame



presents some attempts at carving, and is covered by a beautiful *vert-de-gris*. No. 7 is typical of a further improvement. It is no longer a padlock—it is a real lock, nailed to the boards of the door, pieces of which are still connected with the former. The bolt inside is also of hammered iron, and so is the key; applied to this bolt is what I would call ‘the embryo of a spring,’ the oldest token we have of this accessory. This lock is ornamented outside with ten brass nails, the four at the corners passing through the lock and the boards of the door, on the other side of which they are riveted. The key shown by our illustration No. 8 bespeaks that elegance which later on was to distinguish iron-works of all kinds; human ingenuity, by this time, does not satisfy itself with making contrivances to secure property; it devises ornaments for them, and endeavors to introduce such a variety in key and lock making as to render it more difficult to open locks with any other than the proper key. This specimen of key has in fact a square hole, and the surface of its shank is inlaid with silver. The house in which these and other contrivances were found seems to have been that of a locksmith. No. 9 is a faithful facsimile of an iron jack probably used by the professional man to catch all kinds of bolts, and open doors whose keys were lost. The ornaments on the handle are of brass, and show refined workmanship. The existence of these objects seems to have been utterly ignored by all writers on the subject, as we nowhere find them mentioned, yet they are to be seen in the Imperial Museum at St. Petersburg.

“Next in antiquity come the warded locks in ordinary use. Whence these had their origin is unknown; they seem, however, to have been used by the Etruscans, as rude specimens of them have been found in the excavations opened on the sites where the cities of Luni and Populonia arose three thousand years ago. In the Etruscan Museum of Volterra, a wonderful collection very





No. 13.

little known abroad, there are some locks of this description, which seem, however, to have never fallen under the observation of writers on iron-works. Though our researches have been diligent, we have failed to find that any but a few of the most important objects belonging to this collection have ever been illustrated, and we are therefore unable to furnish engravings of the specimens mentioned above.

“The examples of Roman keys found in various parts of England, and contained in the British Museum, will amply repay examination. Some of the specimens preserved at Marlborough House are not purely Roman; as cuts Nos. 10 and 11 show, they have a national character; so to speak, they are of Celtic architecture. Though the whole of them belong to the same description of lock—the warded lock—they are distinctly different. In locking and unlocking these keys did not perform a complete revolution, and consequently they were identical with the spring locks of modern days. The Gauls, too, seem to have taken their locks from the Romans, as there is no trace of their having been acquainted with the manner of working in iron previous to the invasion of Gaul by the Romans.

No. 14.  
Mediæval Anvil & Smith.

“Puzzle-locks have not been unknown to the less civilized nations, and their antique origin is certain. There are several known by the name of Russian, Chinese, and Hindoo puzzle-locks, some of which have the forms of various animals or birds,



and they are locked and unlocked by pressing upon or moving some particular portions of their bodies. In one of the early volumes of the *Illustrated London News* the accompanying engraving (No. 12) and description of one of the Hindoo locks appeared, which was so far secure in proportion to the amount of reverence felt for the god it is supposed to represent. 'This curious lock,' says the journal quoted, 'is in the form of a bird; probably representing the Hindoo god Garuda, the carrier or bearer of Vishnu, Garuda being to Vishnu what the eagle is to Jupiter. Garuda is worshipped by the natives of Madras; and his living type, a kind of large hawk, is diligently fed by the devotees. The writer has often seen the worshippers with little baskets filled with flesh, which is thrown skillfully, a small piece at a time, into the air, while they shout 'Hari! hari!' a name of Vishnu, and the bird stoops on the wing and takes the prey. Garuda is supposed to possess human or rather divine intelligence, and is much revered. Many stories are told of his discernment and cunning; and it is probably on this account that the native artist has made his lock in the form of Garuda, a sufficient guarantee, in his notion, for its acting as a guard or detector, equal or even superior to the more mechanical and scientific inventions of the kind. We should add that in this Indian lock the key-hole is on the side, one of the wings of the bird serving as a shifting escutcheon.'

“The ravages that followed the downfall of the Roman Empire gave an unprecedented impulse to lock-making—indeed, to the art of working in iron generally. The danger of being robbed at any time was a keen spur for human ingenuity to improve the means of securing property. Painting on glass is not the only art that the Middle Ages made their own, developed and perfected to a marvelous degree; that of the smith was furthered likewise. For the security of property, locking a door became

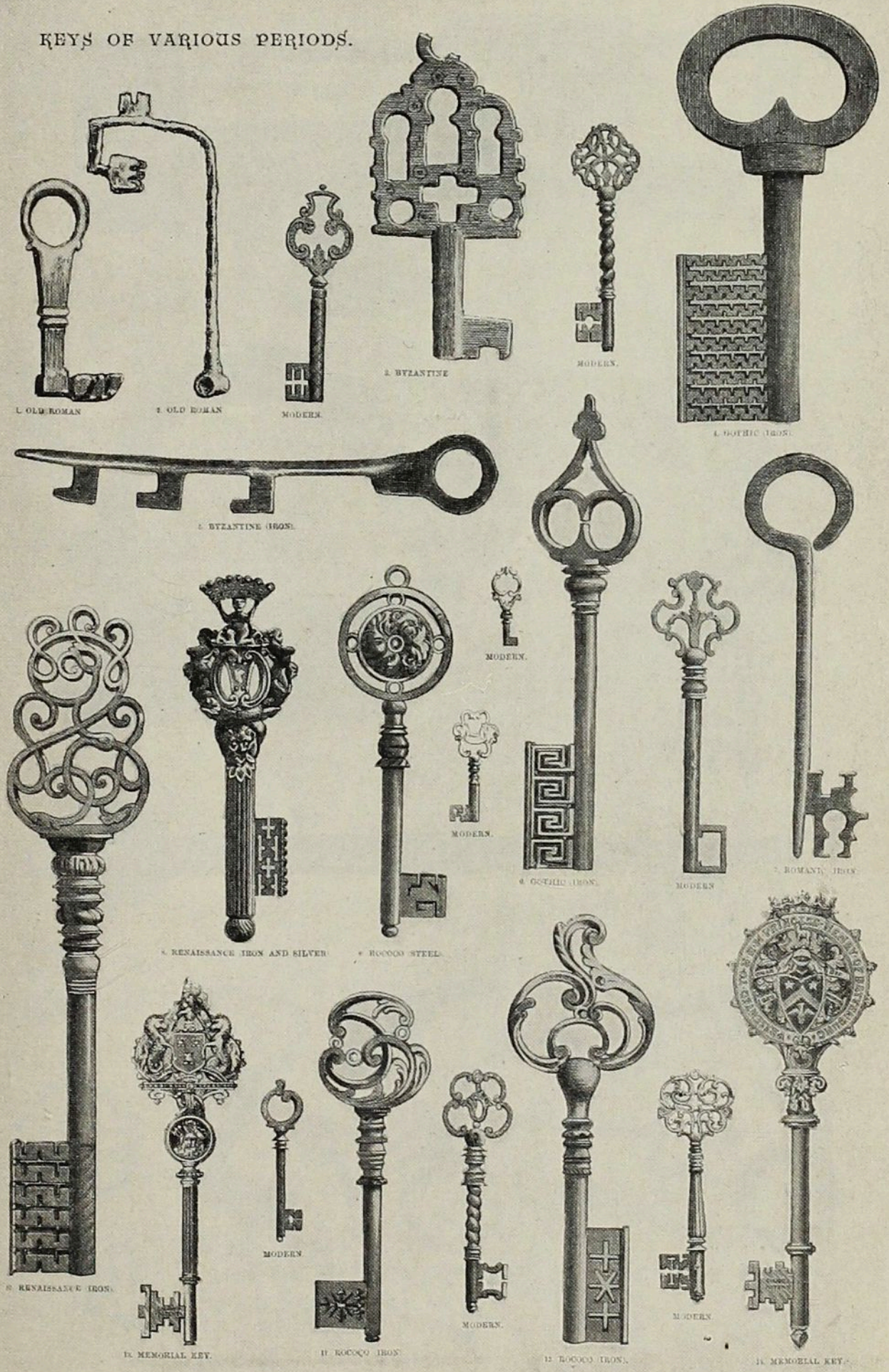


insufficient ; doors were lined with iron plates or strengthened by iron bars, and even made of iron altogether ; locks were applied to any piece of furniture destined to contain valuables, and these, too, were either strengthened by iron network or made of iron. Though the fact has seemingly been overlooked by the historians of safe-making, iron safes began to be built as early as the fifth century of our era. Gregory of Tours, the French Herodotus, relates in his history of France that the Emperor Justinian being dead, Justin II., his successor, full of miserly fears, ‘ordered his smith to construct iron coffers to keep there his thousands of gold-pieces.’ Fredegonde, Queen of France, wishing to revenge herself for some insult she had suffered from her daughter Rigonthe, engaged her to take anything she chose among her mother’s jewels, ‘which were kept in an immense iron chest,’ says the same author. ‘While Rigonthe was thus bent over the open coffer, Fredegonde with unparalleled treachery caused the iron lid to fall on her daughter’s head, and so she pressed on it with all her weight, that the poor girl’s neck, caught between the cover and the rim of the iron box, was nearly severed from her body.’

“During the pagan ages labor had weighed on man as the penalty of a crime ; Christianity transformed it into a glory. In the early centuries of the new religion manual labor, accomplished with resignation and courage, rose up to the level of virtue. The Middle Ages made a goldsmith bishop, several smiths archbishops, and a carpenter Pope. The saints’ calendar of those times is filled with names sanctified by manual labor.”

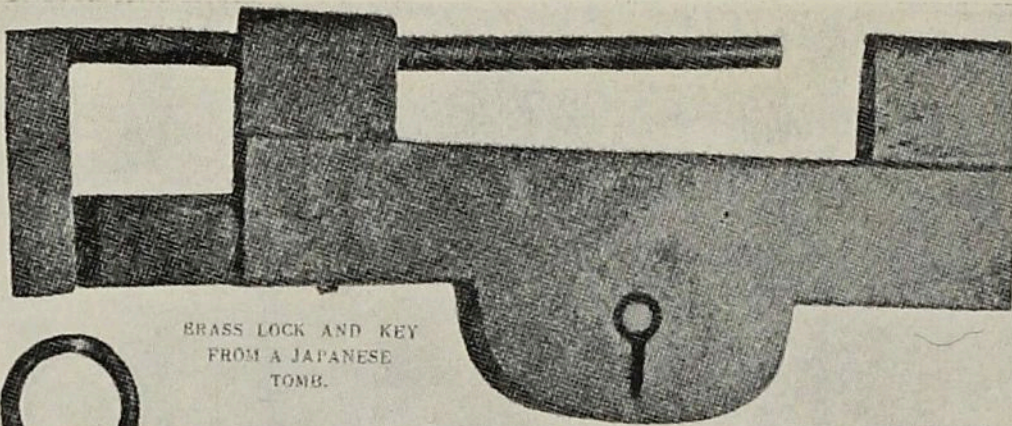


KEYS OF VARIOUS PERIODS.

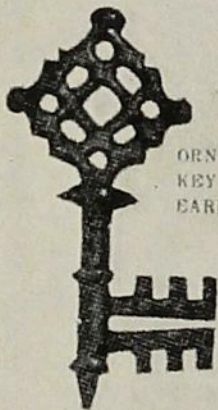


Keys of Various Periods.

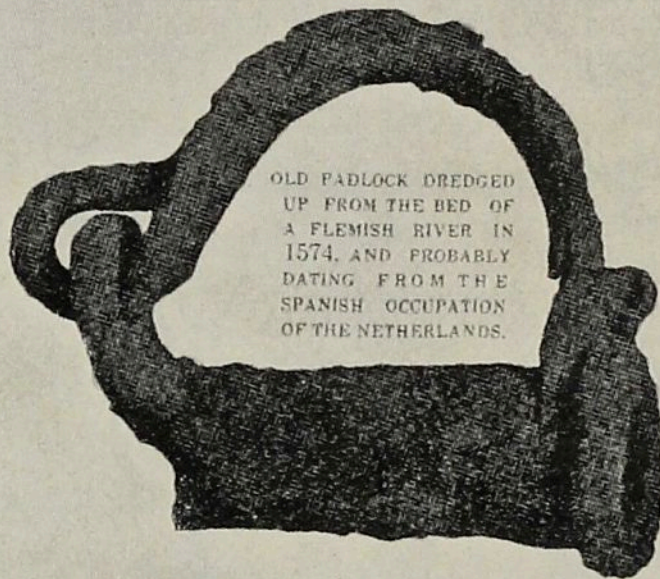




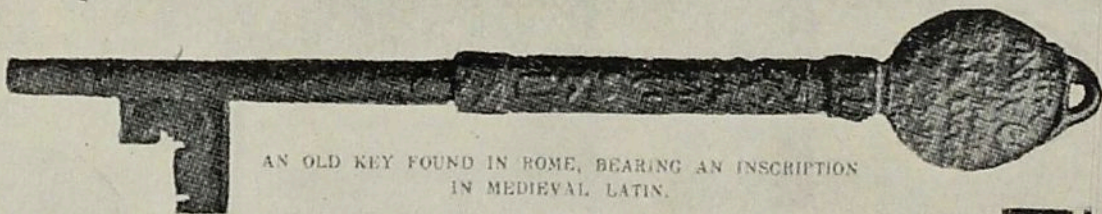
BRASS LOCK AND KEY  
FROM A JAPANESE  
TOMB.



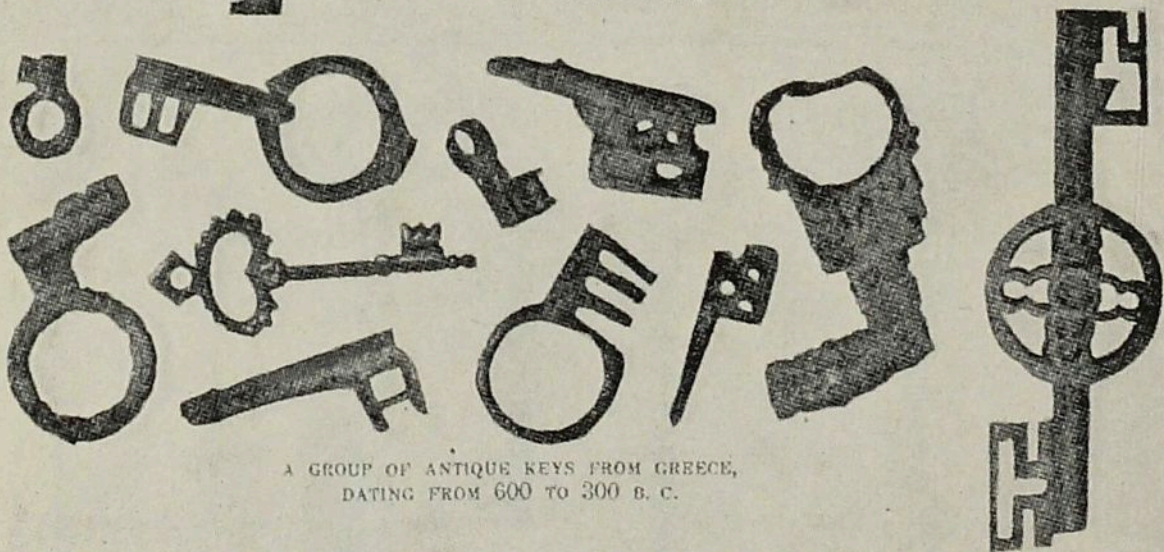
ORNAMENTAL  
KEY IN BRONZE,  
EARLY ITALIAN.



OLD PADLOCK DREDGED  
UP FROM THE BED OF  
A FLEMISH RIVER IN  
1574, AND PROBABLY  
DATING FROM THE  
SPANISH OCCUPATION  
OF THE NETHERLANDS.



AN OLD KEY FOUND IN ROME, BEARING AN INSCRIPTION  
IN MEDIEVAL LATIN.



A GROUP OF ANTIQUE KEYS FROM GREECE,  
DATING FROM 600 TO 300 B. C.

Ancient Locks and Keys.