

PEWTER WARE.*
BY RANDOLPH I. GEARE.

A revival of some of the lesser arts, including the ancient and honorable pewter craft, seems to be at hand, judging by the present demands of the public and by the fact that in some countries, England especially, societies are being organized to encourage the production of artistic objects by hand work. Indeed, a limit seems to have been reached in the employment of purely mechanical methods for the manufacture of house utensils or ornaments which might properly have in them something of the artistic temperament, and manual execution of work in metals and wood, embroideries, etc., is apparently to have another renaissance.

The fact that there will always be in this country an enormous demand for cheap domestic utensils, since a large proportion of the people *must* have the most inexpensive goods that can be obtained, precludes the likelihood of making more than a small proportion of them by hand. But when such objects are required merely for ornament by those who can afford to pay higher prices, manual work may properly step in and take the place of the machine, so far, at any rate, as the decorative features are concerned.

A plain, unornamented vessel may perhaps be as well cast as made by hand, for there is but little opportunity for the impress of human thought; but when decoration is to be added, the machine can but poorly imitate what the hand, guided by intelligence, can execute. How much more pleasing is the thing which bears the stamp of humanity than the one which, however costly may be the materials employed, has been fashioned solely through the agency of a machine.

The reasons that primarily led to the disuse of pewter were the introduction of cheap pottery and glass, together with zinc, block tin and Japanned iron, while the discovery of more silvery and harder alloys, such as Britannia metal, German silver, nickel silver, etc., also hastened its departure.

Furthermore, the increase of machinery during later years, coupled with a desire for easy and quick riches on the part of manufacturers, has unquestionably had much to do with destroying the lesser arts, and the result has been the turning out of much pseudo-artistic ware in pictures, metal and woodwork, embroidery, etc., to which a stereotyped form of ornamentation, utterly devoid of art though often profuse in quantity and color, has been applied, evidently to catch the eye of the unwary public.

In pewter ware, as in the decorative arts, ornament should be felt rather than seen. The moment it becomes obtrusive it is false and superfluous, and while, in the matter of buildings, ornamentation has been described as too often representing the "wine" of architecture, yet a simple and effective decoration can be given to objects pertaining to any industry, even those of the most utilitarian use.

"True ornamentation," writes an art critic, "arises from within the thing to be decorated. It is the effort of personality to express itself. It is the surface manifestation of the vital energy of art. It conveys sentiments and expresses facts. It epitomizes the history of entire races in a design the size of a man's hand. It must play a part in the thing which it adorns, and must express personality. It must not be a superficial, superfluous, and applied decoration devoid of real meaning. It must be harmonious with the thing decorated."

With the increased intelligence of the

present day, it seems probable that, if the pewter craft should be revived, the revival would carry with it at least a fair showing of artistic design, but time alone can show to how great an extent the objects to be manufactured will maintain the dig-

ards—the mold was reversed before the metal became chilled through. What was still molten ran out, leaving a cavity in the interior of the casting, just as in the French art zinc work. The surface of the casting needed no touching except where it was to be left

plain and bright, and then it was turned on a hand-lathe and burnished. Afterward the castings were usually hammered over, to improve their general appearance and to toughen the metal. Spun, hammered and embossed pewter is no longer produced except in the quality of Britannia metal.

In hammered pewter the genius of the worker could best find expression, and some of the most highly decorated specimens were probably produced in this way

—such as the Gloucester candlestick, a work of the twelfth century, and now on exhibition in the British Museum; a superb dish in the Louvre collection made for Henri III.; the salver and flagon with medallion portraits of Augustus of Saxony, and other celebrated pieces.

Pewter was extensively used for church vessels, and in this connection the old English lead fonts come at once into mind; but though none of these objects were actually made of pewter in England, there are several handsome examples in Bohemia, having the form of inverted bells on richly foliated tripods. Holy-water stoups were often made of pewter. There is a record of a pewter canopy over the figure of a saint in St. Vincent's church on the Garonne, in Merovingian times; and Gregory of Tours mentions a basilica roofed with pewter. The construction of organ pipes, too, consumed a large quantity of this alloy, and a record of 1481 shows that 14,500 pounds of it were used on one occasion for that purpose.

Probably the most eminent of the artistic workers in pewter was Briot, a Frenchman, who was born about the middle of the sixteenth century. He made several really fine pieces which have become historic, such as the salver representing in relief the History of Susanna and the Elders. He also made several covered tankards, an excellent specimen of which is in the British Museum, while the Louvre collection contains some superb dishes, probably for baptismal purposes, by the same master. His *chef d'œuvre*, however, is a superb ewer and dish, representing Charity and Temperance. One of his finest salvers is here illustrated.

Howard, in his "Art Dictionary," has reproduced several lists of the pewter objects possessed by men of wealth in olden times. Thus, in 1389 the Bishop of Rheims bequeathed "18 dishes great and small, 48 porringers, a square measure, 2 square quart pitchers, 2 round silver fashion, 1 square pint, 2 measures of 3 chopines silver fashion," etc. The ewers, salvers, and flagons used by the rich and middle classes to decorate their buffets were works of art.

In France the working of pewter as an art-craft dates back to the time when Jules Bratteau and others commenced the production of the most beautiful plaques of pewter for cabinet work and bas-reliefs, as well as coffee sets, canisters, flagons, and other vessels, of original design as well as copies of the great works of the past. In Germany, also, very successful work has been done in pewter, including engraved work, and etching with the effect of "niello," which consists of cutting the design in the metal and afterward filling the incised places with a black alloy.

In the Convent of the Holy Cross at Erfwith, in Saxony, there were found, in 1470, 150 amphoræ, seventy cups, twelve jugs, three porringers, all of pewter, and at St. Cyr 200 pewter amphoræ, flagons, and tankards.

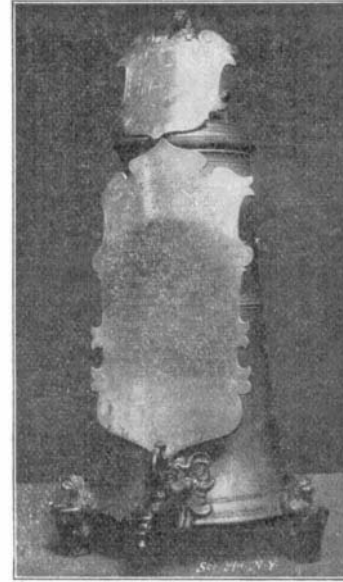
In the sixteenth century the use of pewter ware spread to the bourgeois, and it is recorded as indicative of the wide



A Sixteenth Century Pewter Flagon, Surrounded with Two Bands of Allegorical Figures in Relief.



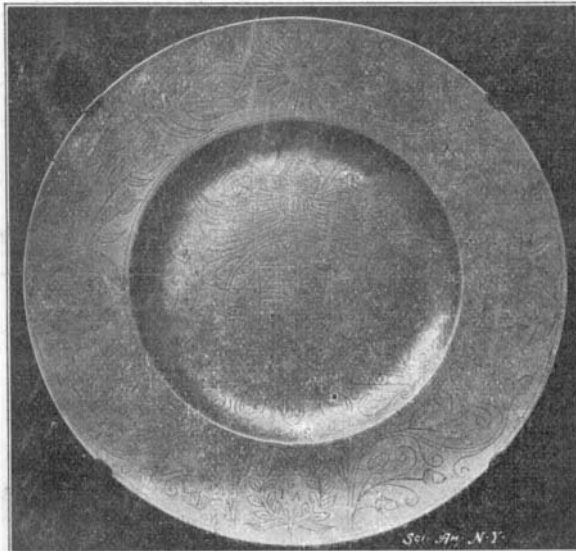
Pewter Salver, Embossed with Medallions, Containing Allegorical Representations. Made by F. Briot in the Sixteenth Century.



An Old German Tankard, Made in Nuremberg 1695. Height 2 Feet 2 1/2 Inches; Diameter at Bottom, 11 Inches.

nity which that industry reached in past centuries.

In bygone days pewter ware was hammered, spun, or cast into shape. The molds were of brass or gun-metal, very carefully fitted, massive, and consequently costly. The metal was poured directly into them, as with lead and zinc; and if hollow castings were required—for instance, in the case of handles for tank-



An English Pewter Platter Bearing the Date 1662 and the Arms of Charles II. Diameter, 22 Inches.

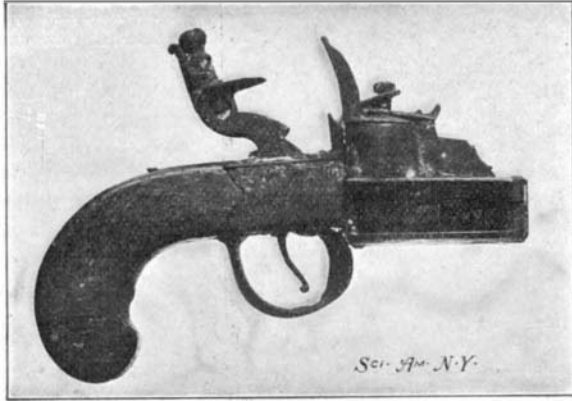


Washington's Mess-Chest and His Camp Outfit with its Articles of Pewter Ware.

PEWTER WARE.

*The photographs herewith reproduced of pewter objects in the Victoria and Albert Museum were prepared especially for this article.

use of pewter at that date that "In France we find even a blacksmith in possession of twelve pewter plates and a tankard." The ware was fashionable too among the high ecclesiastics, as evidenced by the fact that in 1575 the Archbishop of Canterbury possessed "18 score and ten pounds of pewter vessels in the kitchen, in jugs, basins, porringers, sauce-boats, pots, and 19 candlesticks, also pewter measures in the wine



Matchlock (Snuffers) Used at Clean Drinking Manor During the Revolution.

cellar and 8 pewter salts in the pantry of Lambeth, and 2 garnishes of pewter, with spoons, at Croydon." The nobility also adopted its use extensively. Lord Northampton's kitchen as late as 1614 was furnished with 300 pounds weight of pewter, which in great houses was put under the charge of an officer called the "yeoman of the ewerie."

One of the most highly decorated of pewter objects made was a vessel called "cimaise," to hold the *vin d'honneur* (wine of honor), which was presented to kings and princes upon their royal entry into a city. The use of pewter on these occasions was probably in the interests of economy, as the vessels, whatever they might be made of, were almost invariably carried away as mementoes of the occasion.

In the British and South Kensington museums in London, in the Breslau and other European museums, as well as in some American museums and art collections, exquisite and profusely decorated specimens of pewter ware may still be seen. Examples of the ancient uses of pewter, similar to those above mentioned, could be multiplied *ad infinitum*, if necessary, to show that this ware had a distinct standing of its own not merely, or mainly, among the lower classes, but to a marked degree among princes and high officers of the Court and the Church.

The study of the history of pewter (which, as the above remarks may show, is a very interesting one) discloses the fact that in early years the skilled artisans employed in its manufacture were not only themselves anxious to produce the best possible results, but were protected and restricted by municipal or national enactments to aid them in this direction. Moreover, they served to prevent fraud in the composition of the alloy and to check the execution of inferior or slovenly work. Thus, in England, as early as 1348, ordinances were granted by the Mayor of London, permitting the use of only two qualities of pewter; the first, called "finite pewter," contained as much brass as the tin "of its own nature will take." Of this quality were made *esquelles* or porringers, salt-cellars, platters, pitchers, cruets, and other things that were made squared or ribbed. The second quality consisted of tin with about twenty per cent of lead, and this was used for pewter plate. Occasionally other metals than lead were mixed with tin to produce pewter, such as zinc, bismuth, copper, and antimony.

No pewter goods could be brought into the City of London until they had been assayed. In 1430 the exact weight of all the principal vessels of pewter was fixed, to prevent light weight being sold. In 1503 an act of Parliament was passed prohibiting the sale of pewter off the premises of a pewterer, except in open market, and every piece had to bear the maker's mark.

Wardens were appointed to search for defective ware five times a year. In the reign of Henry VIII. statutes were enacted forbidding the importation of pewter, and no foreigner was allowed to practise the trade in England, nor were English pewterers allowed to exercise their

calling abroad under pain of alienation. Under later sovereigns each maker of pewter was obliged to deliver to the "master" a private mark, which was impressed on a plate kept in the hall of the pewterers' company, and with this all his wares were to be



A Colonial Pewter Teapot.

stamped. A fine of one penny a pound was levied on all defective and unmarked pewter. A quaint enactment forbade all pewterers to boast of their goods and disparage those of others, or to entice away the customers of other pewterers. (In passing it may be remarked that such a law now-a-days might considerably injure the advertising business.)

By an ordinance of 1575 every one aspiring to be a master pewterer was obliged to make within the space of a week "a quart ewer on a foot, a dish about four pounds in weight, and a pitcher holding four or five pots, bearing a written snatch or proverb."



Pewter Pitcher and Pot Used by Samuel Chase, a Signer of the Declaration of Independence and Justice of the Supreme Court.



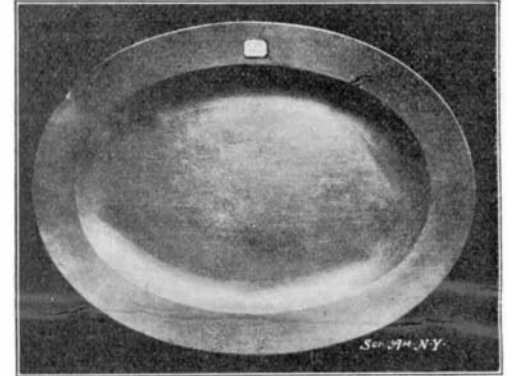
A Pewter Tray, an English Decanter Slide and a Pewter Tankard Used at Clean Drinking Manor, Md., During the Revolution.



A Miscellaneous Collection in Which Are Included Some Pewter Articles Belonging to Washington.
PEWTER WARE.

Silversmiths were prohibited from working in pewter and *vice versa*, and until 1650 it was unlawful to plate with gold or silver any objects made from the baser metals; and even after that date pewter objects covered with silver or gilding had to be specially marked, to prevent their being placed on the market as specimens of the precious metals.

In Rouen a "pewterers' guild" was established, and royal letters were given, fixing the exchange value



A Colonial Pewter Platter.

of new for old metal, and decreeing against improper or fraudulent alloys. So stringent were the laws in aiming at the best results that pewterers were forbidden to work at night, for fear that artificial light might prevent first-class productions. Fines were imposed for unauthorized alloys, and leaden imitations were also punishable.

The manufacture of pewter goods was, as already shown, most extensively carried on in England, France, Germany, and Switzerland during the fourteenth, fifteenth, and sixteenth centuries, and even as early as the time of the Plantagenets pewter chalices were used in English churches.

In Japan pewter objects were made in the eighth century, and the first record of the industry in that country was during the reign of the Empress Shotoku, when pewter vases and various other utensils were manufactured from native tin.

In China the use of pewter was probably still more ancient, but there is no definite record of the date of its introduction.

From England the pewter industry spread to America at the time when wooden ware was in common use, and this it displaced. Quite a number of handsome pieces of pewter ware are still to be found in New England country homes, and the number would doubtless be much larger, had it not been discovered that new pewter is much improved if the metals comprising it are mixed with a certain amount of old pewter.

"Hence," writes Mrs. Alice Morse Earle, "old pewter has always commanded a good price, and many fine old specimens have been melted up to mold over again for the more modern uses for which pewter is employed by printers and lapidaries."

Many of the English pewterers came over to the American colonies in the seventeenth century. Among them was Richard Graves, a pewterer of Salem, and Henry Shrimpton, who became an influential merchant of Boston. These and others made pewter ware for the Massachusetts colonists. Their number increased until the war of independence, at which time the increasing importation of Oriental and English china and stoneware destroyed the pewterers' trade.

"At the time this industry was at its height in New England," continues Mrs. Earle, "pewter cans for beer, cider, and metheglin were found in almost every house; also pewter mugs, dram-cups with funnels; basins, cisterns, and ewers graced the parlors, which latter also contained the best bed for the use of guests. Pewter candlesticks held the home-made pale-green candles of tallow and spicy bayberry wax. 'Savealls' too, were of pewter and iron. These were little round frames with wire points, to hold up the short ends of candles. Salt cellars and spoons also were made of pewter, and pewter porringers or 'pottingers' of every size were much coveted. Plates and platters of pewter were also highly prized."

It is recorded that Governor Bradford of Massachusetts left to his heirs fourteen pewter dishes and thirteen platters, three large and three small plates, one pewter candlestick

and one pewter bottle. This was considered a very luxurious household outfit. Governor Benedict Arnold, of Rhode Island, and Mr. Pyncheon, of Springfield, Mass., bequeathed their pewter plates and dishes, and the humble pewter was just as elaborately lettered and marked with armorial devices as the silver objects.

Pewter was also used in New England for communion services. In 1729 the First Church of Hanover, Mass., bought, and used for years, a full communion service and christening basin of pewter. Some of the pieces are still preserved by the church as relics, while the tankards have been silver-plated and are still in use. As late as the dawn of the nineteenth century advertisements of "pewter communion flagons" appeared in New England newspapers. Pewter dishes and plates were a source of great pride to every colonial housekeeper, and much time and labor were devoted to polishing them with "horsetails" (*Equisetum*)

or "scouring rush," till they shone like fine silver, and dingy pewter was regarded as a disgrace.

In some old homes the pewter utensils have been preserved, and are even now cherished ornaments of the kitchen and dining room. Thus, in an old homestead in Shrewsbury, Mass., its greatest treasures are cupboards and dressers full of pewter dishes. All the plates and platters are round, for oval platters seem to have been then unknown.

Another pewter piece, still in use in some localities, is the hot-water jug with a wicker-covered handle. This, we read, was filled at night with boiling water and brought to the master of the house, for him to mix the apple toddy or sangaree for his household people, who drank out of pewter cups or heavy greenish glasses. Mrs. Earle, who has written very interestingly on the subject, and from whose writings some of the above statements have been derived, mentions two of these jugs which have been in daily use for certainly

forty years, for carrying hot water to bedrooms for shaving purposes, and they still retain the old wicker coverings on the handles, woven perhaps a hundred years ago. "These old pewter dishes, etc.," she continues, "have strange hiding-places. They lurk in tall and narrow cupboards by the side of old chimneys, or in short and deep cupboards over the mantel. They lie in disused fireplaces, or in deep boxes under wide window-seats, and under the dusty eaves of dark attic lofts; or on the highest pantry shelves, under cellar stairs, and in old painted sea-chests they have found a home."

The illustrations used in this article, with the exception of a few to which attention has been called in a foot note, are from photographs of historical pewter ware in the National Museum at Washington. As will be seen from the legends which accompany them, they represent a variety of objects used by persons of eminence in Colonial and later times.

RECENTLY PATENTED INVENTIONS.

Electrical Devices.

CIRCUIT-BREAKER FOR STORAGE BATTERIES.—H. GARRETT, Dallas, Texas. Mr. Garrett's invention relates to an improved circuit-breaker for storage batteries, and more particularly to an appliance for breaking the main circuit of the battery when the voltage reaches a predetermined minimum limit. When properly adjusted at the proper voltage, there will be absolutely no spark at all.

Engineering Improvements.

ROTARY VALVE.—D. W. RANTINE, New York, N. Y. The object in this invention is to provide a rotary valve which is very effective in operation, and arranged to accurately control the admission and exhaust of the motive agent, and thereby insure an easy running of the engine and utilization of the motive agent to the fullest advantage.

VALVE MECHANISM FOR ENGINES.—H. NIELSEN, New York, N. Y. In this case the purpose is to provide an engine arranged to insure a positive shifting of the engine-valve directly from the piston reciprocating in the cylinder, thus dispensing with complicated valve-gear, the arrangement being such that waste and leakage of the motive agent are reduced to a minimum, and the agent is utilized to the fullest advantage, so as to render the engine particularly well adapted for use as a pumping-engine.

ROTARY ENGINE.—C. GUYER, Muncy, Pa. This engine is arranged to utilize the motive agent very economically and expansively to the fullest advantage. Steam is cut off during a desired portion of the stroke of the piston, to allow it to work expansively. As the steam-pressure is equal on the ring and the disk, the piston is completely balanced, and hence the engine runs easily without undue loss of power and without waste of steam.

PROPELLER.—E. BRÜNCKER, Cologne, Germany. The object here is to provide a propeller arranged to insure an effective forward as well as backward action by causing the propeller-blades to readily cut with the forward edges into the water, to allow the water to readily pass from the blades at their rear edges without danger of forming dead-water spaces, at the same time preventing undue resistance and concentrating the active force at the middle portion of the blade, to increase the propelling effect of the propeller when driven forward or backward, and to reduce slip to a minimum.

Heating and Lighting.

FEED-WATER HEATER AND PURIFIER.—T. V. ELLIOTT, Columbia, Pa. This invention is an improvement in feed water heaters for use in connection with steam-boiler furnaces. The water supplied to the feed-water heater is raised to a comparatively high temperature before being discharged into the boiler, and by reason of the upward circulation of the water in the manifolds the water will be purified within the feed-water heater before being delivered into the boiler.

FURNACE.—T. V. ELLIOTT, Brooklyn, N. Y. In this instance the improvement is in furnaces, particularly smoke and gas consuming furnaces, and especially in that class in which oil, air, and steam are utilized in securing a consumption of the gases and other products of combustion; and the invention relates to means for securing the return of the gases and smoke and a disposition thereof within the furnace.

BOILER-FURNACE.—E. F. COMBER, Selkirk, Canada. One object the inventor has in view is the provision of a bridge-wall by which warm air in regulated volumes may be supplied to the combustion-chamber of a furnace at a point back of the fuel-grate, the air being free to commingle with the gaseous products of combustion and calculated to promote the combustion of the gases and of carbon in the smoke. Besides with steam boilers, the improvements may be used in hot-water boilers and in connection with any kind of furnaces for power and heating purposes.

Miscellaneous.

SHOE-LACING.—J. MCMAHON, Bemidji, Minn. The purpose in this invention is to provide an anchorage device for one end of the

lace secured at the lower portion of the front opening for the upper of the shoe adjacent to the vamp and a series of pulley devices which are secured to the upper quarters at opposite sides of the front opening which devices are guides for the lace and are in alternate arrangement, and to provide the upper quarter of the shoe at opposite sides of the upper portion of its front opening with guide hooks.

PHOTOGRAPHIC CAMERA.—H. W. HALES, Ridgewood, N. J. The object of the improvement is the provision of a camera arranged to produce an exceedingly sharp and brilliant image on the focusing medium and subsequently on the sensitive plate or film in such a manner that the operator while focusing can view the image right side up or non-inverted.

NOTE.—Copies of any of these patents will be furnished by Munn & Co. for ten cents each. Please state the name of the patentee, title of the invention, and date of this paper.

Business and Personal Wants.

READ THIS COLUMN CAREFULLY.—You will find inquiries for certain classes of articles numbered in consecutive order. If you manufacture these goods write us at once and we will send you the name and address of the party desiring the information. In every case it is necessary to give the number of the inquiry. MUNN & CO.

Marine Iron Works, Chicago. Catalogue free. Inquiry No. 4908.—For manufacturers of small brass or gilt chain.

For mining engines. J. S. Mundy, Newark, N. J.

Inquiry No. 4909.—For makers of small brass caps used on pencils.

"U. S." Metal Polish. Indianapolis. Samples free.

Inquiry No. 4910.—For manufacturers of common wood button molds.

AUTOS.—Duryea Power Co., Reading, Pa.

Inquiry No. 4911.—For manufacturers of pressed metal in No. 18 steel and about 9 inches diameter.

Handle & Spoke Mch. Ober Mfg. Co., 10 Bell St., Chagrin Falls, O.

Inquiry No. 4912.—For manufacturers of carpet-cleaning machinery.

Sawmill machinery and outfits manufactured by the Lane Mfg. Co., Box 13, Montpelier, Vt.

Inquiry No. 4913.—For drawings or blue print of a 4 h. p. horizontal gasoline engine.

Manufacturers of patent articles, dies, metal stamping, screw machine work, hardware specialties, machinery and tools. Quadriga Manufacturing Company, 18 South Canal Street, Chicago.

Inquiry No. 4914.—For hard rubber, glass or porcelain jars for battery use; to be rectangular in shape of special dimensions.

American inventions negotiated in Europe, Felix Hamburger, Equitable Building, Berlin, Germany.

Inquiry No. 4915.—For a thermometer having an indicator at a distance from the tested material.

Special and Automatic Machines built to drawings on contract. The Garvin Machine Co., 149 Varick, cor. Spring Streets, N. Y.

Inquiry No. 4916.—For manufacturers of attachments for invalids' tables, for holding medicines, books, papers, etc.

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Inquiry No. 4921.—For straw presses that will tie, bale, and deliver bales automatically from the press.

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Inquiry No. 4922.—For makers of money alarm drawers.

Inquiry No. 4923.—For the present address of the Nashua Mill Co.

Inquiry No. 4924.—For the address of the manufacturers of the "Farmers' Windmill."



HINTS TO CORRESPONDENTS.

Names and Address must accompany all letters or no attention will be paid thereto. This is for our information and not for publication.

References to former articles or answers should give date of paper and page or number of question.

Inquiries not answered in reasonable time should be repeated; correspondents will bear in mind that some answers require not a little research, and, though we endeavor to reply to all either by letter or in this department, each must take his turn.

Buyers wishing to purchase any article not advertised in our columns will be furnished with addresses of houses manufacturing or carrying the same.

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Books referred to promptly supplied on receipt of price.

Minerals sent for examination should be distinctly marked or labeled.

(9256) H. W. H. writes: What per cent of power per horse power of heat is lost in the water used by a gas engine? A. It is impossible for us to give you any definite answer to the question. We would say, however, that in a general way it is true that a gas engine utilizes, as a rule, less than 25 per cent of the heat generated, and about half of the loss is usually carried off by the jacket water.

(9257) O. C. S. says: Can a man working but a short time do twice as much work when turning two cranks, such as are used in a boring machine much used by carpenters, as he can when turning but one crank and standing in the most favorable position? If not, why not? How much can he do compared with a man turning a single crank? When working all day can a man do any more turning two cranks than he can when turning one crank? Please give figures showing the relative amount of work done. A. In reply to your inquiry regarding the amount of work that a man can do when turning two cranks, such as are used in a boring machine, as compared with the amount that he could do turning but one crank, we would say that there is no definite data on this subject. The amount of work that a man can do in a given length of time is greatest when the motions required of him are the most natural and most favorable to the strength of his muscles. Thus, as work is a product of force times distance, a man is able to do but very little work when the force required is so great that he can overcome it through only a short distance in a given amount of time. On the other hand, he will accomplish little work if the force is very small, and he is required to work too rapidly. Between these limits there is a relation of force to speed in which he can do the maximum work. A man can accomplish no more turning two cranks than he can accomplish turning one crank, provided the one crank is so arranged that he can work favorably with both arms upon it, and exert a force which will give the most favorable relation between force and speed to produce the maximum work. Practically, it is found that the two cranks set at 180 degrees in a boring machine, similar to the pedals of a bicycle, give a condition which is exceedingly favorable for the average man to do his maximum work.

(9258) H. A. P. says: Will you kindly answer the following questions? I have two coils of 1-inch pipe. One is 11 inches and the other is 5 inches in diameter inside measure; both have seven and a half turns. The small coil fits inside the large coil and is coupled at top and bottom. The flow must heat to 30 deg. beneath a "hover" 72 feet by 24 inches by 6 inches, returning through the "run," 72 feet by 3 feet by 3 feet, heating to about 60 deg. Would a double or triple line of pipe be suggested, and what size (pipe)? Will I place the expansion tank on the flow, or return, close to heater or otherwise? The pipe will be on a level. A. You have not given us information enough in your inquiry to make it possible for us to answer your questions. Without knowing exactly the heat to which your coils are subjected, we cannot tell

you the rate of circulation or the amount of heating surface needed to raise the water to any given temperature.

NEW BOOKS, ETC.

THE NEW INTERNATIONAL ENCYCLOPEDIA. Volume X. Infantry to Larramendi. Edited by Profs. Daniel Coit Gilman, LL.D.; Harry Thurston Peck, Ph.D., LL.D.; Franklin Moore Colby, M.A. New York: Dodd, Mead & Co. 1903. 8vo. Pp. 986.

In taking up the tenth volume of this truly important work, we are more than ever convinced of the great merit which this encyclopedia possesses. Its treatment of all subjects is most admirable, and the scientific articles and definitions are both concise and reliable. The illustrative features add greatly to the interest of the volume. The inclusion of the lives of living persons is especially to be commended. The maps are fine examples of the cartographer's art. Technical matters are far from being neglected; thus, under "Ink" we find a very common-sense discussion of black ink, red ink, blue ink, aniline inks, metallic inks, special inks, sympathetic inks, ink powders, and printing inks, together with several bibliographical references of considerable value. The good points of the general scheme of the encyclopedia are emphasized by the sustained work which characterizes each successive volume.

INDEX OF INVENTIONS

For which Letters Patent of the United States were Issued for the Week Ending December 15, 1903.

AND EACH BEARING THAT DATE [See note at end of list about copies of these patents.]

Table listing various inventions and their patent numbers, including items like Abdominal support, Acid and cyanid salt, Air brake safety device, etc.