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Improved Street Letter-Box for Lamp Posts.

In attaching letter-boxes to lamp posts, where they are made to surround the shaft of the post, many inconveniences are met with, and although this method of fastening is very secure, the inconveniences alluded to have rendered some method of accomplishing the same end without removing the lantern and ladder bar, and slipping the box over the shaft, very desirable. Our engravings show a method whereby the desired attachment is secured, with other improvements in letter-boxes, which not only render them tasteful in appearance, but more convenient in use.

The difficulties in slipping such boxes on the posts from the top, arise from the various sizes and styles of posts, the rusting fast of the ladder bar and other ornaments at the top of the post, the frequent attachment of awning frames, etc.

The box under consideration obviates all these difficulties. It is constructed in two hemispherical sections, A and B, Fig. 1.

One of these sections is cast with a flanged rim, as shown in the sectional drawing, Fig. 2, which overlaps the other, so that wedges cannot be introduced to separate them when they are bolted together. Each of the sections has lugs cast on its interior edge, through which square heade bolts with nuts are inserted to hold the hemispheres together.

It will be observed that these bolts are nserted from the inside, through the hand door, C, of the box—also used to extract the letters by the carriers—and the bolts are thus placed out of the reach of tampering.

The castings are made to conform to the shape of the post, and are fastened on the inside by bolts to the shaft so that they cannot be removed by sliding them up along the post. The joints are all rendered water-tight by suitable cement, and the globular shape of the box not only enables it to shed rain in the best manner, but also to resist blows from wheels of vehicles.

The drop holes are made without movable lids, being protected by a projecting shield, as shown. This is a great convenience, as the use of one hand only is required to insert letters. The closing of an umbrella in a rain storm, or the setting down of a basket or a child in arms, in order to put a letter in the box, is thus obviated.

POTTS' IMPROVED STREET LETTER-BOX.

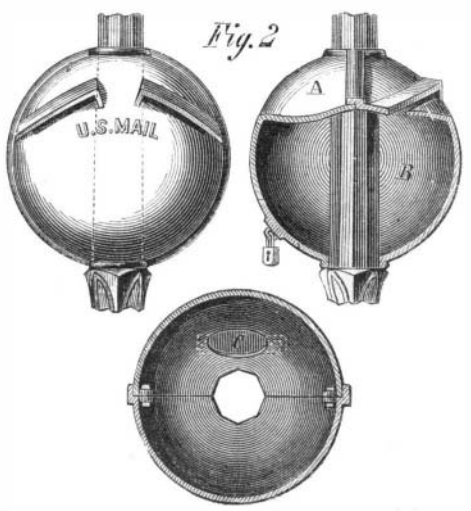
The spherical form of the box also facilitates the removal of the letters, as they collect together at the bottom of the box, the drop holes being so placed that the letters fall at right angles with the door on either side of the shaft, but not behind it.

Patented, through the Scientific American Patent Agency, December 6, 1870, by Albert Potts, of Philadelphia, Pa.

History of Carpeting.

Carpets and rugs were manufactured at a very remote period in Egypt, India, and China; but those of Persia and Turkey are the most celebrated. They were originally used for sitting and reclining upon, as may still be observed in eastern countries, where they constitute the entire furniture of the people. In Egypt they were first applied to religious purposes by the priests of Heliopolis, and were also used to garnish the palaces of the Pharaohs. It was also a custom of antiquity to place them under the couches of guests at banquets. Sardinian carpets are mentioned by Plato, the comic poet, as being disposed in this manner: "Beneath the ivory feet of purple-cushioned couches." The carpets of the Homeric age were generally white or plain cloths; but they were also sometimes produced with various colored and embroidered designs. At the supper of Iphicrates, purple carpets were spread on the floor; and at the magnificent banquet of Ptolemy Philadelphus (an account of which is given by Callixenus of Rhodes), we learn that underneath 200 golden couches "were strewed purple carpets of the finest wool, with the carpet pattern on both sides; and there were handsomely embroidered rugs, very beautifully elaborated with figures. Besides this," he adds, "thin Persian cloths covered all the center space where the guests walked, having the most accurate representations of animals embroidered on them." The Babylonians, who were very skillful in weaving cloths of divers colors, delineated upon their carpets entire groups of human figures, together with such fabulous animals as the dragon, the sphynx, and the griffin. These were numbered among the luxuries of Heliogabalus. On the tomb of Cyrus was spread a purple Babylonian carpet, and another covered the bed whereon his body was placed. These carpets were exported in considerable quantities to Greece and Rome, where they were highly esteemed. Carthage was also noted by Hermippus, Antiphanes, and others, for its magnificent carpets.

Sir J. Gardiner Wilkinson, long since dead, gives an account of an ancient carpet rug of Egyptian manufacture. "This rug," he says, "is made like many cloths of the present day, with woolen threads, on linen strings. In the center is the figure of a boy in white, with a goose above, the hieroglyphic of a 'child,' upon a green ground, around which is a border composed of red and blue lines," etc. He further informs us that there are in the Turin museum some fine specimens of worked worsted upon linen, "in which the linen threads of the weft had been picked out, and colored worsted



sewed on the warp." In these two examples we have evidence of the existence, at a very early time, of a system of tapestry weaving. The ancient carpet manufacture of the Asiatic countries may resolve itself under the appellation of needle work. Of this the present system of carpet weaving in Persia and Turkey, and the tapestry manufacture of France, may be considered as fitting examples. The tapestry, as is well known, consists of woolen or other threads sewed on the strings of the warp, by means of small shuttle needles. The Persian carpet is formed by knotting into the warp tuft after tuft of woolen yarn, over each row of which a woof shot is passed, the fingers being here employed instead of the shuttle needles, as the fabric is of a coarser description. In both methods the principle is the same. Both are formed in looms of very simple construction, the warp threads are arranged in parallel order, whether upright or horizontal, and the fabric and pattern are produced by colored threads, hand-wrought upon the warp. This may be designated the hand-wrought or needle-work method, which only makes one stitch or loop at a time, in contradistinction to the machine-wrought process, the result of mechanical appliances, whereby a thousand stitches are effected at once. Herein lies the essential difference between the ancient and modern, the simple and complex carpet manufacture.

In Persia there are entire tribes and families whose only occupation is that of carpet weaving. These dispose of their productions at the bazars to native merchants, who remove them to Smyrna or Constantinople, where they meet with European purchasers. The trade in real Persian carpets is, however, very limited, owing to their small size. They are seldom larger than hearth rugs, long and narrow. Very many of them, moreover, are considerably tarnished by exposure in bazars, if they have not indeed been already used. To render them more salable they are cleaned. This is done by cropping the surface, which in some cases is shaved quite close to the knot, hence a great portion of those brought to this country have not their original richness and depth of pile. Felted carpets or *nurmuds* are also made in Persia, but do not constitute an export commodity. Sir Henry Bethune, late Persian ambassador from England, had in his possession a very singular specimen of this felt carpeting, in which colored tufts of worsted had been inserted during the process of manufacture, producing a regular pattern when finished.

The greatest part of those Turkey carpets imported into England is manufactured at Ushak or Ouchak, in the province of Adin, about six days' journey from Smyrna, and rugs principally at Kulah or Koula, an adjacent village. In the province of Hoodavendigniar, Adana, and Nish, numerous households are employed in their production, as also in the districts of Bozah, the city of Aleppo, and the villages of Trebizond. Here and there throughout Caramania, such carpets are also made. The Turcomans of Tripoli, the women of Candia, and the peasantry of Tunis and Algiers, are likewise engaged in their fabrication. In none of these places, however, does any large manufactory exist; the carpets are the work of families and households. These carpets are woven in one piece, and there is this notable peculiarity in their manufacture, that the same pattern is never again exactly reproduced; no two carpets are quite alike. The patterns are very remarkable, and their origin is unknown even to Mussulmans. The Turkey carpet pattern represents inlaid jeweled work, which accords with eastern tales of jewels and diamonds. If this were rightly understood, it would prevent such speculations as those of Mr. Redgrave in his great exhibition report on designs, where he remarks that "the Turkish carpets are generally designed with a flat border of flowers of the natural size, and with a center of large forms conventionalized in some cases even to the extent of obscuring the forms, a fault to be avoided." This is doubtless a very ingenious mode of accounting for the curious forms of a Turkish carpet; but these, however fantastic, are never obscured, nor are there any flowers, flat or otherwise, in the border or elsewhere. The great beauty in these carpets lies in the equal balance of color, of dull neutral shades, somewhat somber in effect.

Generally throughout British India the carpet manufacture is carried on. At Benares and Moorshedabad are produced velvet carpets with gold embroidery. A very elaborate carpet sent from Cashmere to the great exhibition of Maharajah Goolah Singh, was composed entirely of silk, and excited great admiration. In every square foot of this carpet, we are informed, there were at least 10,000 ties or knots. Silk embroidered hookah carpets are made at Lahore, Mooltan, Khyrpoore Tanjore, and Bengal; cotton carpets, or *satrunjees*, at Rungpoor, Agra, and Sasseram; printed cotton carpets at Ahmedabad; printed floorcloth at Mooltah. Woolen carpets are far more extensively manufactured. Some come from Ellore, Mirzapoor, and Goruckpore, but the principal manufacture is at Masulipatam, 292 miles north of Madras. There the capital and enterprise of England have lent their aid to the rather tardy movements of the natives, and this article is now in

general demand. Of late years, linen warp has been introduced instead of cotton, and the fabric is thereby much improved. The design of the Indian carpets have more regularity than those of Turkey, and the colors are mostly warm negatives, enlivened with brilliant hues interspersed. For the introduction of Masulipatam carpets, as of many others into the trade, we are indebted to the firm of Watson, Bell & Co., whose Indian connection was the means of obtaining these beautiful fabrics.—*Carpet Trade.*

The Cameo-Medallion Carte-de-Visite.

The apparatus necessary for the production of cameo-medallion cartes is very simple, and comprised in the following articles:

(*a*). A four-footed metal water bath, capable of being heated by means of a spirit-lamp, into which a square porcelain dish is placed, whose overlapping sides fit over those of the water bath. This dish, which is furnished with a lip, is employed to maintain the gelatin fluid at a high temperature.

(*b*). The stamp, consisting of two square wood blocks connected together with hinges; between the blocks is fixed a brass plate also upon hinges, having in the middle an oval opening large enough to contain a bust portrait. The wood blocks open in the manner of an album, in which the brass plate, as it were, takes the place of the carte, and are, on the outside, perfectly smooth. On the inside of one of the blocks is an oval, in relief, of the exact dimensions of the opening in the metal plate; and on the other block is a corresponding hollow of oval form.

(*c*). A press which can be tightly closed by means of screws. A linen or bookbinders' press will answer the purpose well, if such can be obtained, but I have myself constructed a small wooden press expressly for the process which answers exceedingly well.

The above is all the apparatus necessary for the production of these portraits. In the first place, some pattern ovals are cut out of thick black paper, using the oval opening in the brass plate and a sharp penknife for the purpose, the cutting operation being effected at one sweep. In this way are obtained masks and small oval mats, which fit precisely into one another, and are, moreover, identical in size with the opening in the metal plate, and the relief and intaglio in the wood blocks. A print from a portrait negative, with graduated background, is then taken out of the pressure-frame, and over it is placed one of the masks, in a position most favorable to the picture; and when the same has thus been centered, the oval mat corresponding to the mask is placed upon the print, and the mask withdrawn. The print is then exposed to the sun under a glass plate, the middle being still covered with the black mat, which must not be allowed to shift from its place, and thus a darkly-tinted, or even black, margin is printed around the oval picture. The print, in this condition, is then toned, fixed and washed, and finally sized in gelatin. The latter operation is performed by the aid of some glass plates of the required size, which are carefully cleaned, as if to serve for negatives, and then rubbed over with finely-powdered stone alum (luff stone) by means of a tuft of cotton wool, the superfluous powder being afterwards removed with a soft dusting brush. These plates are coated with a four per cent normal collodion, and placed to dry in a spot free from dust. When perfectly dry, a quantity of gelatin is dissolved in hot water in a beaker, the solution being of the consistence of the collodion previously employed. This is filtered through a piece of linen into the porcelain bath, which has, in the interim, been warmed by means of the water bath, and should be maintained at an even temperature during the whole period of working.

The prints intended to be gelatinized are, in the first instance, trimmed to the right size by means of a cutting glass, and are then immersed bodily into the gelatin solution, so as to be fully impregnated with the same. The glass plates coated with collodion are now taken in hand; the prints laid, face downwards thereon, care being taken that all air bubbles between the paper and glass are carefully pressed out and removed; afterwards a sheet of stout white paper, somewhat bigger than the print, is cemented to the back of each photograph, a precaution for protecting the pictures in the event of their spontaneously leaving the glass on drying.

The plates are allowed to remain for ten or twelve hours (say over night) in a dry locality, and, at the end of that time, the portraits may be separated from the glass by making an incision of the film all round the paper. The superfluous paper should be trimmed off previously to the pictures being mounted upon cardboard.

After drying, the carte is put through a steel press, and is then placed in the embossing stamp to give it the desired relief.

Many of the manipulations may be slightly modified if desired. For example, instead of cementing a piece of paper to the back of the prints, the card itself, if not very thick, may be at once attached, and the margins thereof thus gelatined, the process of rolling being in this way obviated. Some photographers add a small quantity of sugar candy to the gelatin, in order to prevent the sizing solution drying too rapidly, and to render the finished card more plastic and impressionable.

I am in possession of a large collection of these pictures, which appear as brilliant and beautiful as photographic enamels. Almost all of them have been produced by Italian firms, and by far the greater part of them have a deep-black border round the oval bust. A few of them betray a tendency to curl up at the edges, but all those which have been produced by the process I have just described have remained quite flat and even. This *modus operandi* is, moreover, to be recommended from the fact of its having been adopted by some of the first firms at Vienna, who have recently turned out some very beautiful results through its agency.—*Carl Krziwanek, in the Photographic News.*

The Toys of the Past---A Record of Departed Joys.

Itinerant toymen seem always to have dealt in a class of ware different from that sold in shops. Early in this century a Chinaman who sold a small drum, which, with peas inside, answered the purpose of a rattle, and a fish suspended at the end of a line, was as well-known a figure as the old Turk who sold rhubarb in Cheapside. There was another drum which was hung from a stick by a piece of horsehair, and when this was whirled round a rattling sound was produced, not by the drum itself, which was merely a weight, but by the friction of the horsehair against the stick. A modern and very attractive street toy was an ingenious machine, the mere movement of which causes a large flock of clay birds to flutter down a number of wires. Ten years have now elapsed since this ingenious toy was at the hight of popularity, but we do not often see it now.

The flat wooden snake, with joints of catgut, which, held by the tip of the tail, waves backwards and forwards to the terror of timid urchins, has still its place in some toy-shops; so also has the toad, whose tail, turned round, is fastened under the throat with cobbler's wax, and who leaps when the wax becomes less adhesive, though this rude method of producing spontaneous motion is driven into shade by the more perfect clockwork. But a snake made of a single spiral shaving of horn, with a solid head of the same material, which was capable of being extended to a considerable length, and which, when pressed together, was packed into a small cylindrical box, has fled beyond the limits of my observation. A fault in this mimic reptile was the ridiculously extreme delicacy of its constitution. The vertebral column, of which alone its body was composed, was always getting some unfortunate twist, and any attempt to repair the misfortune was generally followed by a compound fracture. Equally fragile were those little hollow wax dolls, which are now furnished by shops of the humblest kind, where the bottle which contains them is ranged with other bottles, scantily stocked with sugar-plums, brandy-balls, and other old-fashioned dainties. Like many specimens of the great toy, man, the little hollow doll had its social status once, though it is now in lowly places. I recollect very well the attempt of a young lady in her teens to dress such a doll. She worked with fairy fingers, but the attempt to put a sash round the waist had a result like that which is said to arise from the bite of a huge shark, and which is described in the pathetic ballad "Bryan and Pirene." Destined to perpetual destruction, the little wax doll had its avenger in the sturdy Dutch mannikin, which is utterly indestructible, save in its hair, and which, seated on a table, had a knack of bobbing forward, and assailing its proprietor with its hard, sharply pointed nose. The hollow doll's successor is the little china doll of the present day, which, always connected with a bath, seems to have been created for the purpose of perpetual ablution. Be it borne in mind that in olden times, every doll was a miniature of a grown-up person. The doll representing infancy is a modern invention, and in the French vocabulary has a name to itself, being called a "bêbè," whereas the other doll take the generic name "poupèe."

The hideous demon, made of furry material, which, by means of a worm-spring within its body, jumps out of a cubical box, continues its ugly existence; but the dainty little sentinel, who lived in a cylinder, and whose worm spring was under his feet—the only veritable Jack-in-the-box—has receded. Gone, too, is the wooden apple, which, opened, revealed another apple, which, opened, revealed a third, which, opened, revealed a fourth, and so on, till we come to a tiny fruit, which contained two tiny spoons, guaranteed to be of pure silver. Both the Jack-in-the-box and the apple plunged into bad company, and that is, perhaps, the cause of their downfall. For many years they were used as prizes at the ignoble game of "cock-spy," and were set upon slim poles to be knocked down by cunning marksmen. The apple, I suspect, was of Oriental origin. At least, dainty boxes, constructed on the same principle, but made out of the choicest woods, and elaborately ornamented, are to be found in every cabinet stocked with articles of Indian vertû.—*All the Year Round.*

The West Abutment of the St. Louis Bridge.

[From the Chief Engineer's Report].

Although the bed rock at the site of this abutment is seventy-three and a half feet higher than at the east pier, the difficulties encountered in building its foundation were of a much more perplexing and tedious character than those encountered at either of the others. Its site had been for over sixty years a part of the steamboat wharf of the city, and as such had received every kind of useless material thrown overboard from the various steamers lying over it during that time.

The old sheet iron enveloping their furnaces, worn-out grate bars, old fire bricks, parts of smoke-stacks, stone-coal cinders and clinker, and every manner of things entering into the construction of a Mississippi steamer seemed to have found a resting place at this spot, and constituted a deposit averaging twelve feet in depth over the rock. During the memorable fire of 1849, when twenty-nine steamers were destroyed at the levee, the wrecks of two of them sunk upon the site of this abutment. One of these was partly covered by the hull of the other, which probably sunk immediately afterwards, The lower one was but two or three feet above the bed rock. After this terrible conflagration the city authorities determined to widen the wharf. Its front was extended to a line inclosing about one half of these two wrecks, by filling in with stone and rubbish from the city.

During this extension several other vessels were burnt at the wharf, and the wreck of one of these also sunk upon the site of the abutment. The coffer dam, constructed to inclose the site, had to be put down through these three wrecks, the hulk of either of which was not probably less than four hundred tuns measurement. Their bottom planking was all of oak, three or four inches in thickness. To drive the sheet piling down through these hulks, an oak beam six by ten inches square, armed with a huge steel chisel, was first driven down as far as a steam pile driver could force it. It was then withdrawn, and a sheet pile, five by ten inches square, was driven down in its place.

The coffer dam was formed of two courses of sheet piling, six feet apart, which were filled in between with clay. When this was completed, the water pumped out, and the excavation prosecuted within it, the discovery was made that from one third to one half of the length of each of these three steamboat hulks was inclosed within the dam, and that some of the sheet piling had not been driven through the lower one, owing to the great resistance of the hulk and the mass above it.

Before the space between the lower wreck and the bed rock could be made secure on the inner side of the dam the water came through and flooded the inclosure. A stream from a powerful Gwynne pump, having an eight-inch diameter of jet, was then directed against the material deposited over these wrecks on the outer side of the dam, where the water was fifteen feet deep, and enough of the deposit was washed away to enable another course of sheet piling to be driven down six feet beyond the dam, through all of the wrecks to the rock. After this, that part of the wrecks inclosed between this last course of piling and the dam was removed by a diver and the space filled in with clay, and the inclosure again pumped out. This portion of the dam, about fifty feet in length, was by this construction made double. As the excavation within progressed it revealed the fact that another portion of the dam had been built and made water tight through and over a water wheel of one of the wrecks. The crank of an engine of seven feet stroke attached to the head of the shaft of the wheel was just within the inclosure, while the flanges, arms, and braces of the wheel were within the walls formed by the sheet piling.

From the inclosure within the dam were taken parts of several old and burnt steamboat engines, the iron parts of some of which had to be cut off at the dam. Four wrecks of barges, some of them in use doubtless before the era of steam, were also found within it; likewise several oak sawlogs, some anchors, chains, and a great variety of smaller articles lost or thrown overboard from the river craft, or dumped in from the city.

This incongruous deposit made it exceedingly difficult to maintain the integrity of the dam, which at times had to resist a pressure of thirty feet of water. Frequent floodings consequently occurred, which delayed and increased the cost of the work. These difficulties were, however, finally overcome, and the bed rock within was at last exposed to view.

On the 25th day of February, 1868, after thoroughly testing the solidity of the rock by drilling, the first stone of the bridge was laid in this abutment fifty-five feet below high water mark, about four months after commencing the construction of the dam.

Chilblains and Chapped Hands.

The returning cold, damp weather brings in its train the seasonable series of complaints, such as chilblains, chapped hands and lips, etc. These appear to be most prevalent just now, amongst those exposed to the inclemency of changeable weather, who possess a fair complexion, delicate skin, and other constitutional predispositions. To those especially liable to these tiresome and painful affections, we recommend as a preventive wearing kid skin gloves lined with wool, which not only keep out the cold, but absorb any moisture that may be upon the hands; and to rub over the hands before washing a small quantity of glycerin, which should be allowed to dry or become absorbed to a partial extent. When chilblains do manifest themselves, the best remedy not only for preventing them ulcerating, but overcoming the tingling, itching pain, and stimulating the circulation of the part to healthy action, is the liniment of belladonna (two drachms), the liniment of aconite (one drachm), carbolic acid (ten drops), to collodion flexile (one ounce), painted with a camel's-hair pencil over their surface. When the chilblains vesicate, ulcerate, or slough, it is better to omit the aconite, and apply the other components of the liniment without it. The collodion flexile forms a coating or protecting film, which excludes the air, whilst the sedative liniments allay the irritation, generally of no trivial nature. For chapped hands, we advise the free use of glycerin and good olive oil in the proportion of two parts of the former to four of the latter; after this has been well rubbed into the hands and allowed to remain for a little time, and the hands subsequently washed with Castile soap and tepid water, we recommend the belladonna and collodion flexile to be painted, and the protective film allowed to permanently remain. These complaints not unfrequently invade persons of languid circulation and relaxed habit, who should be put on a generous regimen and treated with ferruginous tonics. Obstinate cases are occasionally met with, which no local application will remedy, until some disordered state of system is removed, or the general condition of the patient's health improved. Chapped lips are also benefited by the stimulating form of application we advocate, but the aconite must not be allowed to get on the lips, or a disagreeable tingling results.—*London Medical Journal.*

Labor and Wealth in the United States.

Henry Ward Beecher says: One of the greatest causes of thanksgiving is that labor whistles and sings in our territories. Elsewhere it is mourning its own death. The prodigious facilities for acquiring wealth in America are just beginning to be perceived. The wealth is here, easy to be developed, concentrated, and administered. The being "worth a million" won't make a man eligible to the class of rich men much longer. Some think wealth dangerous. Wealth is power, and that is always dangerous, but no nation ever rose from a barbarous state without it. Missionary preaching is of no use if it does not show the heathen how to make money. No poor man can be much in a poor community, although among nabobs his intellect may compensate for lack of worldly goods. But riches must be somewhere. The dangers of wealth here are less than we fear. Organized wealth oppresses the community, but will yet prove itself a benefactor. It tends to despotism because of its nascent state. It is not necessary that the wealth which owns the market should also own civility, or should control courts and legislatures. But we must consider the hygienic qualities of wealth. It is the almoner of employment, of comfort, of enjoyment. Money is vivifying industry to the very bottom of the community. Riches are the poor man's providence, and on the whole, are in subordination to intelligence and domestic virtue. How to use money is an art. Many can make money, who haven't the slightest idea of spending it correctly, while many more can spend that don't know how to make; but, as a general thing, money earned wisely is expended discreetly. Men live here in better constructed houses—which require more ingenuity to keep constructed—than anywhere else. The money-producing force of America is more than double the average money-producing force of any other nation. There are 25,000 land-owners in Great Britain. Here land is so cheap that scarcely an inhabitant but owns his plot, whether little or big. I know farmers I should hate to meet in argument unless I were on their side, while many hammer away at the anvil all day and read scientific and historical works all the evening. Men who deride money are almost invariably minus the article themselves, and, if they will only consider, will find that the universal diffusion of wealth is one of America's greatest blessings. Get rich! Pay anything for it but yourself, your honor, love, sympathy, faith in man, and faith in God. Wealth here is public spirit. Architecture is its adopted child. Cornell, Vassar, Cooper, and hundreds of others, are significant American names, and the time approaches when wealth shall be symbolic of every public improvement. Wealth has its evils and temptations, but to-day is something for which we, as a nation, may thank God, and pray that the time may not be far removed when the streets of gold spoken of in Scripture may be here on earth.

Progress in Japan.

"Great Japan, ruled by our wise Emperors, is superior to all other countries in the world." So says the Japanese patriot and philosopher, Kato Lukeichi; and certainly the most recent accounts we have of the proceedings of these orientals, places them in strong contrast with the "Western barbarians." In Japan, bridges are being built; in France, they are being blown up. In Japanese waters, numerous fixed and floating lights and buoys are being provided for the guidance of the navigation; in the Baltic, they are being removed and taken up. In the one quarter of the world the desire is that the safety of the ships may be secured; in the other, that they may be destroyed. The municipal council of Osaka is carrying out an efficient system of paving and drainage; is macadamizing their suburban roads, and adorning the city by planting 500 or 600 trees. On the other hand, the drainage of the Western continent is blocked and corrupted by the corpses of men and the carcasses of horses, and Paris, the fairest city of the West, is being made a great pest and charnel house, and the vernal beauties of the environs have been stamped out, and they have been changed into a hideous wilderness. The princes of Japan are fitting up improved machinery at their coal mines, and building cotton mills; the princes of Prussia are "assisting" in the destruction of grand and venerable cathedrals, splendid libraries, and the most beautiful works of nature and art, and are making "requisitions" for bread and wine to a ruined and starving population. The disastrous doings of the Westerns in prosecuting the art of war we know of but too well, from the harrowing details with which our daily papers are filled; of the more humane and creditable performances of the orientals, in prosecuting the arts of peace, we are informed by her Majesty's consuls at the Japanese ports open to foreign commerce. These reports have been published quite recently. The foreign trade done at these ports—Karrawaga, Hiogo, and Osaka, Nagasaki, Haokdati, and Niigata—may, according to Sir Henry Parkes, be taken at ten millions sterling, of which above half is in British hands. It gave employment, in 1869, to 1,043,405 tuns of foreign shipping, 398,264 tuns of which were British. The returns of shipping are exclusive of native junks and river boats. At some of the ports, the large proportion of the trade conducted by British ships is very remarkable, the proportion being greater than that done by the foreign vessels of all other nations together. The foreign commerce of Japan, considering area and population, is growing, it appears, more rapidly and satisfactorily than even that of China. The total imports, in 1869, were of the value of 17,356,932 dols., and the exports 11,475,645 dols.

The Hartford Steam Boiler Inspection and Insurance Company.

The Hartford Steam Boiler Inspection and Insurance Company makes the following report of its inspections for October, 1870:

During the month 522 visits of inspection were made and 920 boilers examined—702 externally and 234 internally, while 136 were tested by hydraulic pressure. Number of defects in all discovered, 418—number of dangerous defects, 44, which in detail are as follows:

Furnaces out of shape, 12—1 dangerous; fractures in all, 13—5 dangerous; burned plates, 22—2 dangerous; blistered plates, 51—8 dangerous; cases of sediment and deposit, 72—5 dangerous; cases of incrustation and scale, 50—4 dangerous; cases of external corrosion, 22—4 dangerous; cases of internal corrosion, 15—1 dangerous; cases of internal grooving, 5; water gages out of order, 4—2 dangerous; safety valves overloaded 20—2 dangerous; pressure gages out of order, 74, varying from −10 to +20; boilers without gages, 2—1 dangerous; cases of deficiency of water, 8—2 dangerous; broken braces and stays, 12; boilers condemned, 6—6 dangerous. Two cases have been found where there were stopcocks between the safety valve and boiler. They were both removed before the boilers could be accepted by this Company. Several mud drums have been found in bad condition. These drums are usually bricked in, and cannot be thoroughly examined unless the brick work is removed. They corrode rapidly, and should be examined at least once a year.

As will be seen there have been 11 explosions during the month, by which 9 persons were killed, and many wounded. Several of these explosions were of new boilers. Many people think that when they have put new boilers in their works, they are perfectly safe. Such, however, seems not to be the fact. One of the most terrific explosions which has occurred within the year, was of a new boiler. From subsequent examination, a fracture was discovered in one of the flues, which was regarded as the cause of the accident. From unequal expansion and contraction, resulting from urging the fires injudiciously, the fracture came, and so far as could be ascertained, the flue collapsed, and an explosion followed. The six boilers condemned have been replaced by new ones.

PERPETUAL MOTION.

NUMBER III.

The two self-movers, which it has been claimed were really such, were the inventions of the Marquis of Worcester, author of the "Century of Inventions," and Jean Ernest Elie-Bessler Orffyre, or Orphyrreus, who is usually named Orffyreus in English and German works. The latter was born in 1680, near Zittau, in the department of Alsace, France, and early studied theology and medicine, but his erratic genius was only to be satisfied by engaging himself in the pursuit of a variety of the mechanical arts and painting. He asserts that it was during his search for whatever might prove curious and valuable that he discovered perpetual motion, and between the years 1712 and 1719, made two machines on his system; one he desired to exhibit publicly, but broke it up rather than submit to the payment of the license or tax required by the Government of Cassel; the other he destroyed after its having been unfavorably reported on by M.'S Gravesande. He published, in German and Latin, a book or pamphlet entitled "*Le Mouvement Perpêtuel Triomphant*," quarto, dated Cassel, 1719. Other accounts differ respecting the breaking of the second machine; and, on insufficient authority, Mr. Partington styles him a "German mechanic." Dr. William Kenrick, among his miscellaneous works, wrote "An Account of the Automaton, or Perpetual Motion of Orffyreus, with additional remarks," in editions dated 1770 and 1771. Orffyreus died in November, 1745.

The following is a description of the Marquis of Worcester's wheel, described in the 56th article of the "Century of Inventions," as "An Advantageous Change of Centers."

"To prouide and make that all y^e weights of y^e defcending syde of a wheele shal be perpetually further from y^e center, then thofe of y^e mounting syde, and yett equal in number and heft of ye one syde as y^e other. A most incredible thing if not seene, butt tryed before y^e late King of happy and glorious memorye in y^e Tower by my directions, two Extraordinary Embaffadors accompanying his Ma^{tie} and y^e D. of Richmond, D. Hamilton, and most part of y^e Court attending him. The wheele was 14 foote ouer, and 40 weights of 50 p^d apiece; S Wm. Belford, then $Lieu^t$ of y^e Tower, and yet liuing can justify it with seuer ll others; they all saw that noe sooner these great weights passed y^e Diameter Line of y^e vpper syde but they hung a foote further from y^e center, nor no sooner passed the Diameter line of the lower syde, butt they hung a foote nearer; bee pleased to judge y^e consequence."

Of the inventions of these two men Dircks says:

"The only appeal that can be made in apology for the pursuit of perpetual motion, is derivable from the results represented to have been obtained by the Marquis of Worcester in one instance, and by Orffyreus in another. All the circumstances relating to their singular inventions excite our curiosity, raise our skepticism, and induce us to pause in our decision. Let us first consider the inventors personally; and, secondly, their inventions and the circumstances attending their exhibition. The two men were of very different character and position in life. The first noble by birth, of ancient lineage, loyal to the extent of sacrificing his property in support of the cause of Charles I., and evidencing by his prayers, his truly religious sentiments. About or before 1648 (as the King died 1649), he exhibited his wheel, or perpetual motion, in the Tower, before his Majesty, two extraordinary Ambassadors, the Duke of Richmond, Duke Hamilton, most part of the Court, and Sir William Belford, Lord Lieutenant of the Tower. We have to consider the upright character of the Marquis, his having invented the steam engine, his worthiness in all respects, and the circumstances here detailed, and then ask ourselves: Little as Science favors any belief in such an invention, can we see any reasonable grounds for error in this great experiment, or believe that a person so distinguished, and so much to be admired in all other respects, could thus boldly and recklessly deceive himself, his noble company, and the public taking ten years or upwards to elaborate and record a gross falsehood? It seems incredible, and true respect for the Marquis' memory will go far to maintain doubts respecting the infallibility of all mathematical demonstrations adverse to the possibility of a self-motive power. Secondly:

"Orffyreus was of humble origin, had versatile talents, and fickle, discontented, unsettled, irregular, and eccentric. He was ambitious, boasting, and the very man to raise up enemies. Between 1712 and 1718 he made and destroyed in succession four wheels or machines. He had learnt the art of clock-making, and several mechanical arts, and is supposed to have constructed or put these wheels together himself. He had a princely patron, who wished to obtain practical results from the invention for manufacturing and other operations. A misunderstanding ensues; and from that time to his death, in 1745—at least twenty-eight years—the subject lies dormant, and the invention dies with him. This last fact, coupled with the wheel having raised so great a weight as 70 lbs., makes a doubtful case still more doubtful; and particularly when, about the same time, Geiser imposed on the German public with a mere piece of clockwork, as a true perpetual motion.

"The Marquis of Worcester's wheel was fourteen feet in diameter; it was rotated by the action of forty 50-lb. weights —2,000 lbs.—an enormous weight, requiring some very laborious operations of the carpenter to erect a sufficiently strong framework. Its completion must have taken some time, and led to frequent visits from the noble inventor, as well as experiments to test its correct working, before offering a practical demonstration before majesty.

"Orffyreus' fourth or last wheel, at Hesse Cassel, was twelve feet in diameter, fourteen inches broad, made of light oak framing, and covered with oil cloth. It would revolve either way, and this alone casts a shade of doubt on there being any deception in practice with it. But, strange to say, it had power enough to raise 70 lbs. to a considerable hight. Its operations were seen and attested by so many, that these broad facts rest not alone on the inventor's authority. It was so ingeniously made, that M. Gravesande wrote to Sir Isaac Newton on the subject; and his letter and mathematical reasonings, in reference to the matter, appear in his works, edited by Professor Lalande, 1774."

The following is the letter written by Professor 'S. Gravesande to Sir Isaac Newton, in regard to the wheel of Orffyreus.

SIR,—Doctor Desaguliers has doubtless shown you the letter that Baron Fischer wrote to him some time ago, about the wheel of Orfyreus, which the inventor affirms to be a perpetual motion. The landgrave, who is a lover of the sciences and fine arts, and neglects no opportunity to encourage the several discoveries and improvements that are presented him, was desirous of having this machine made known to the world, for the sake of public utility. To this end he engaged me to examine it; wishing that, if it should be found to answer the pretensions of the inventor, it might be made known to persons of greater abilities, who might deduce from it those services which are naturally to be expected from so singular an invention. You will not be displeased, I presume, with a circumstantial account of this examination; I transmit you, therefore, a detail of the most particular circumstances observable on an exterior view of a machine, concerning which the sentiments of most people are greatly divided, while almost all the mathematicians are against it. The majority maintain the impossibility of a perpetual motion, and hence it is that so little attention hath been paid to Orfyreus and his invention.

For my part, however, though I confess my abilities inferior to those of many who have given their demonstrations of this impossibility; yet I will communicate to you the real sentiments with which I entered on the examination of this machine. It is now more than seven years since I conceived I discovered the paralogism of those demonstrations, in that, though true in themselves, they were not applicable to all possible machines, and have ever since remained perfectly persuaded, it might be demonstrated that a perpetual motion involved no contradiction; it appearing to me that Leibnitz was wrong in laying down the impossibility of the perpetual motion as an axiom. Notwithstanding this persuasion, however, I was far from believing Orfyreus capable of making such a discovery, looking upon it as an invention not to be made (if ever) till after many other previous discoveries. But since I have examined the machine, it is impossible for me to express my surprise.

The inventor has a turn for mechanics, but is far from being a profound mathematician, and yet his machine hath something in it prodigiously astonishing, even though it should be an imposition. The following is a description of the external parts of the machine, the inside of which the inventor will not permit to be seen, lest any one should rob him of his secret. It is a hollow wheel, or kind of drum, about fourteen inches thick and twelve feet diameter; being very light, as it consists of several cross pieces of wood framed together; the whole of which is covered over with canvas to prevent the inside from being seen. Through the center of this wheel or drum runs an axis of about six inches diameter, terminated at both ends by iron axes of about three quarters of an inch diameter upon which the machine turns. I have examined these axes, and am firmly persuaded that nothing from without the wheel in the least contributes to its motion. When I turned it but gently, it always stood still as soon as I took away my hand; but when I gave it any tolerable degree of velocity, I was always obliged to stop it again by force; for when I let it go, it acquired in two or three turns its greatest velocity, after which it revolved for twenty-five or twenty-six times in a minute. This motion it preserved some time ago for two months, in an apartment of the castle, the doors and windows of which were locked and sealed, so that there was no possibility of fraud. At the expiration of that term indeed his serene highness ordered the apartment to be opened, and the machine to be stopped, lest, as it was only a model, the parts might suffer by so much agitation. The landgrave being himself present on my examination of this machine, I took the liberty to ask him, as he had seen the inside of it, whether, after being in motion for a certain time, no alteration was made in the component parts; or whether none of those parts might be suspected of concealing some fraud; on which his serene highness assured me to the contrary, and that the machine was very simple.

You see, Sir, I have not had any absolute demonstration,