respondent), and other Eastern ax makers, have, for years past, and up to within a short time, always demanded a high temper steel, claiming that it made a much keener edge than a mild or low temper, and was preferable on this account. At the same time the ax would not stand near the abuse in the chopper's hands, it being more easily broken than if made of a mild temper.

The Western ax manufacturers have for years past invariably used nothing but the mild temper, principally manufactured in this city, and of a quality unsurpassed by any made abroad. A high temper steel, while it is claimed it will give a finer edge in a cutting tool, has so many drawbacks attending its use, that the one redeeming feature—the superior cutting edge, is a very expensive and questionable luxury. It is much easier burnt in the process of welding, and easier broken in practical use, especially in frosty weather; and the writer has always been surprised that Eastern manufacturers of edge tools, and of axes especially, would discard a mild tempered steel that is not easily burnt in the process of welding, is tough and strong, and in every way preferable to the other. The difference in the cutting edge is so very fine that the practical chopper cannot appreciate it; for if he did, the Western ax makers, who produce nearly one half of the axes manufactured in the United States, would have had their attention called to this point before this. So that for the benefit of those engaged in manufacturing edge tools, you will be pleased to learn that both mild and high tempered steel for tools has been manufactured in the city of Pittsburgh for years past, of unexceptional quality, and especially the temper which your correspondent is so anxious to obtain, viz.: a low or mild steel, the requirements of ax makers.

Pittsburgh, Pa. AN AX MAKER.

Bean Sheller Wanted.

MESSRS. EDITORS:—Farmers badly want a machine to thresh beans of all kinds. It should be made like the corn shellers with a balance wheel with pulley attached so as to be used either by hand or power, and should be so contrived as to shell beans of different sizes. Such a machine, to cost not more than thirty to forty dollars, would meet large sales both North and South and be a boon to the farmers beside.

Prospect Hill Farm, Va. C. R. M.

A Valued Testimonial.

MESSRS. MUNN & CO.:—Enclosed please find the "wherewith" to renew my subscription to the SCIENTIFIC AMERICAN.

My old friends, I would willingly send you subscribers could I do so; but the illness of almost four years, confining me to my house, renders me unable to do so; yet I can send out your circular. Your books will show I have been a subscriber ever since the SCIENTIFIC had a being. My age and illness admonishes me that my name must disappear from your books ere long forever—but I trust for a world without affliction, pain, or sorrow, and where there is no parting.

But, be life longer or shorter, I must have the paper to the end, and shall leave for it my best wishes; and I say most sincerely that I consider it the most valuable paper printed, of any kind. I have only one child, a son, who, if he survives, will be a subscriber in my place.

Please tell your subscribers if you think proper, to follow my example: "Always be subscribers to the SCIENTIFIC AMERICAN; and when a paper comes, stitch it with a fine thread, cut it open, leaving it in book form, convenient for reading, which do carefully and thoroughly; keep it clean; and at the close of the volume, if not ready to get the numbers bound, put them together in proper form for binding, put a board or 'straight edge' on each side, near the back, and then press strongly in a vice; punch holes through them and tie up tightly with a strong cord, and thus have a book."

Schenevus, N. Y. A. HOTCHKIN.

WATER POWER OF THE CONNECTICUT---THE HOLYOKE DAM.

About ten years ago, Mr. Alfred Smith, a citizen of Hartford, Conn., purchased about eleven hundred acres of land on the site of the present flourishing manufacturing town of Holyoke, Mass., now containing over 1,100 permanent residents. It has now in operation fourteen paper mills, two large thread mills, four cotton mills, and other manufacturing concerns, One of the paper mills, that of the Holyoke Paper Company, makes six tuns of paper per day.

The dam, which here controls the whole power of the Connecticut, is one of the most remarkable instances of engineering skill in the country. The Hartford *Times* says: "The only question of the assured and certain success of the company, and the growth of Holyoke to a great manufacturing center, being merely one of the durability of the great dam, Mr. Bartholomew and the company have wisely gone to work to make the dam absolutely indestructible. The work of improvement here is one of far greater magnitude than we had supposed; and its impressiveness as a triumph of engineering skill and a proof of what men's labor can effect over the rude forces of nature can be properly appreciated only by being seen.

"In the flood of last spring the front timbers of the dam were slightly loosened by the concussion of a huge and heavy bridge, which came crashing down on the flood from some point a hundred miles above. An examination of the front foundations, while it disclosed no very serious injury to the great dam, revealed another fact of some interest. The river bed at this place is for a considerable distance composed of rock—but a rock full of seams; and the steady, continuous fall of the great sheet had by hydrostatic pressure lifted out the rock in masses, and scattered boulders of a tun to twenty tuns weight for a considerable distance down stream—making, at last, a great hole in front of the dam, from twenty-six to thirty feet deep! or as deep as the deepest places in New London harbor.

"It was found necessary to check this destructive work; and accordingly the dam, which has for so many years presented a sheer fall from its edge, will now be made with a sloping front as well as rear; so that it would, if the river were dry, present an outline similar to that of the peaked roof of a house. This front extension is fifty feet in diameter at the base, presenting a uniform slope to the top, that will so graduate the fall, for its entire width of over a thousand feet, as to make it look more like a great rapid than the old familiar Holyoke dam.

"This work is done by sections; the first, which was begun in September and is now nearly finished, being 269 feet wide in the middle of the dam.

"It is made of solid timbers, fastened in layers crosswise, in the way known to builders as "crib-work," and filled in with an enormous ballasting of stone. These solid masses of timber, bolted and riveted together for such an extent and hight, present, to one unaccustomed to it, a very impressive sight. Unlike the old dam, the new front will be solid; no open work timbers. The timber "cribs" are sunk, and the rock ballast filled solidly in beneath them in the higher part, with a good deal of engineering skill. The engineer is Mr. S. S. Chase, whose uncle, we believe, built the original dam. He floats down a good deal of his timber from Vermont. It consists largely of hemlock, a timber which resists decay and the action of water beyond most others. Chopping into the wood of the old dam, shows that twenty years have failed to damage it a particle; it is as sound as ever.

"They have put down in this section about one million feet of timber. That fact tells the story of the literal solidity of the new dam.

"It is found that the weight or force of the stream, exerted against the dam at all times, is nearly four thousand tuns. The weight of this new structure above the water is 13,000 tuns.

"Looking at it from the shore, this section of 269 feet seems but a little part of the whole breadth of the fall; but to a person standing on it, at its lower or its upper edge, it seems in itself a "big thing."

"The construction of the fish-way, for salmon and shad, had to be delayed on account of this improvement on the dam. It will be made, at the east end of the dam, as soon as the latter is finished.

"One of the rocks lifted out from its natural bed by the hydrostatic pressure in front of the old dam, weighed, before Mr. Chase blasted it, twelve tuns; and yet it had been taken out and moved a hundred feet down stream by water power."

There are between twenty and thirty mills and factories in active and profitable operation at Holyoke, all the power required being taken from the great dam. It is distributed at present by three canals at different levels, and affords an immense power. The water power of the Connecticut at Holyoke is estimated by competent engineers as equal to that of Lowell, Mass., and Manchester, N. H., combined. It subjects to the service of man the whole volume of the Connecticut river, which here pours over a steady flood, reliable at all seasons, of 1,017 feet in breadth, at a fall of between 25 and 30 feet, but less than one-fifth of the power is yet utilized.

Successful Trial of the Shelbourne Submarine Drill.

Considering that it is an entirely new invention, and has never yet been thoroughly tested, Mr. Shelbourne's experience with his machine for drilling sunken rocks during the last three days in the swift currents of Hell Gate must be considered as eminently encouraging. As was intimated in our previous article, the pipe used to convey the exhaust steam from the engine inclosed and sunk with the "mushroom" was found too flexible and too small. A larger and firmer one had to be procured from Boston, causing a delay which prevented any trials of the drill from being made on Tuesday. Yesterday the new pipe was severely tested in a very swift current, and found to work satisfactorily. Assuming the machinery of the drill to be in working order, the first problem is to keep the floating derrick stationary while the holes are being bored. The *Wallace*, the boat which has been chartered by Mr. Shelbourne, is about sixty feet long, and quite shallow, yet on Monday it was found impossible to hold her with several large granite boulders, weighing four tuns each. These were intended for use only as temporary moorings, while four holes six feet deep, should be made by the drill for the insertion of ring bolts. To these, which are marked out like the bases on a base-ball ground, with reference to the pitcher, cables will be extended from the *Wallace*, which will then be firmly fixed as though tied to a wharf. Yesterday the first hole was drilled and the first ring-bolt inserted. While the tide was still running strongly, and contrary to the advice of her experienced commodore, the *Wallace* steamed out over the Frying Pan and dropped one of her boulders overboard. At first the current slowly carried the vessel along, the huge stone dragging on the bottom, but at length the anchor caught in the rocks below, and the *Wallace* was brought to. So far so good; but work must be done before the turning of the tide. The ponderous "mushroom" is swung out over the boiling waters, while the diver incases himself in his horrid habiliments. Both speedily find their way to the bottom. The diver sees that the drill is in proper position, and everything being reported right, at last Mr. Shelbourne gives the word to turn on the steam. It works to perfection. Standing by the anaconda-like steam pipe, you can hear distinctly the machinery in operation below. An hour passes, and the tinkling of a little bell gives the longed-for information that a hole six feet deep has been sunk in the Frying Pan Rock. The ringing of this little bell is one of the most beautiful ideas embodied in the invention. It is done by electricity, and is, in fact, the Atlantic Cable on a small scale. Mr. Shelbourne pulls a cord, which reverses the motion of the machinery, and presently another tinkle of the bell informs him that the drill is withdrawn from the rock, and that the "mushroom" is ready too root itself in another spot. And now the diver, with a ring-bolt six feet long, a sledge-hammer, and other implements, descends again, and in an amazing short space of time is drawn up to announce that "he has stuck a pin." There not being time to shift the position of the *Wallace*, anchor again, drill another hole, and get off this tide, the "mushroom" is hoisted on board, and we start back for Jersey City. To-day another and perhaps two ring-bolts will be put in. When all are down, and the *Wallace* permanently moored, Mr. Shelbourne will be ready to work night and day, and soon Hell Gate will be shaken by the discharge of nitro-glycerin, and the diabolical Frying Pan and Pot be shattered.—*New York Tribune of Jan. 14th.*

Clock making in Bristol, Conn.---Ingenious Inventions.

Bristol, Conn., is noted for the manufacture of clocks. The business is divided and subdivided into several distinct branches, so that there are only five firms in the town that manufacture complete clocks, while twenty firms are engaged in making the different parts of the same. The New Britain *Record* gives the names of these firms as follows:

"The Bristol Brass and Clock Company, where the brass is rolled into plates; the brass founderies of Lester Goodenough, where ratchets and sockets are cast; the works of the Bristol Foundery Company, where the weights and alarm bells are cast; the works of L. F. and W. W. Carter, where movements and cases are put together and the finished clock with Lewis' patent calendar attachment is produced. Clock springs and springs for toy movements are made by E. B. Dunbar and Wallace Barnes. S. E. Root makes sash and paper dials patented by himself. W. H. Nettleton makes lock works and pillars, and straightens and cuts wire. A. Warner and Mr. Taylor make verges, pendulum rods, and wire bells. N. Pomeroy, L. Hubbell, and S. E. Root manufacture movements. E. N. Welch Manufacturing Company, Atkins Clock Company, E. Ingraham & Co., and Mr. Partridge are large manufacturers of both movements and cases. Geo. W. Brown & Co. have also a large factory for the manufacture of clockwork toys.

"The clocks are produced in great variety, and range in price from one to eighty dollars each. Some are so constructed that by one winding they will run respectively, thirty hours, eight days, thirty days, and one year. A self-winding attachment is also made at Bristol, which is placed in the draft of the chimney, and the clock no sooner runs down than the draft, operating a fan, winds it up again. This little invention is a source of great income to its author. A perpetual calendar attachment, which will correctly indicate the day of the week and month, is also made, the patentee of which receives as royalty for the right to manufacture an income of $3,000 per year. An important improvement on the original invention has recently been made and secured by letters patent.

"Most of the workmen employed in clockmaking are 'specialists' who have labored many years at some particular part, and though they have become experts at their business, their wages are lower than those of most other mechanics, ranging from $1·75 to $2·25 per day. Much of the work is 'put out' to be done by women and girls.

"At present the clockmakers are busy making movements for a walking doll, a New York firm employing five hundred girls in making the dolls to which they are to be attached. Many other mechanical movements for various purposes are also made, among which are movements for lamplighters and fans, cradle rockers and baby swings (in which the baby is the pendulum ball), coffee roasters, works to ignite torpedoes, and works for a variety of animated toys. The first clockwork toy ever made was a toy engine, invented at Bristol, but the inventor never took out a patent, and probably escaped the miseries of a large fortune."

An Opportunity for Enterprise.

Not seldom we are addressed by inventors soliciting aid in the disposition of the improvements they have perfected, their object, generally, being to dispose of the whole or a portion of their patent right in return for present pecuniary assistance. As we invariably decline doing a commission business of this character, we can take no action upon such appeals, unless occasionally to draw attention to the matter by a notice in our columns.

A case now before us, however, we cordially commend to the attention of those who are seeking a desirable investment for a moderate sum. It is an improved weighing scale, the subject of a patent just obtained by S. S. Hamilton, who may be addressed at Taylor's Falls, Chisago Co., Minn. Very favorable terms for the patent may be obtained by addressing the inventor as above, as he is in ill health, which precludes him from personal attention to the necessary business of manufacture and introduction. We think the opportunity is a good one to obtain an interest in a valuable invention, and at the same time assist a very worthy invalid to go to a warmer climate, which his health demands.

FUSEL oil, tannin, acetate of lead, oil of vitriol, strychnine, creasote, Prussian blue, mountain dew. The *World* has done the community good service in exposing the villainous compounds which are daily sold to our citizens under the name of rum, gin, brandy, and whisky. What will the *World* say to the enactment by the Legislature of a law prohibiting the sale of such poisonous compositions, unless prescribed by a competent physician? The inquiry strikes us as a pertinent one, in view of the exposure which has just been made. We hope that our able cotemporary will give the public the benefit of its views upon this question.

Improvement in Railway Car and Locomotive Wheels.

Much of the necessary expense of working railway lines is to be charged to the deterioration of the rolling stock, subjected, as it is, to the constant percussion of one rigid body, the wheel, on another unyielding surface, the rail. The slightest degree of elasticity in either would partially remedy this evil, and reduce the cost of repairs to track and rolling stock; but if this elasticity is confined wholly to the track, the power necessary to propel a train is enhanced, although the attention of railway managers, both in this country and Europe, has been for several years directed to methods intended to secure a permanent way. The elasticity sought, on the other hand, for the rolling stock, is wholly confined to springs interposed between the axle and the body or weight of the carriage or engine. It is well known, however, that this does not relieve the excessive wear and rapid deterioration of the rolling or running parts—the wheels and axles—which are subjected to perpetual hammerings. The objects of the improvement, illustrated in the accompanying engravings, are to provide a wheel which while always presenting a rigid face to the surface of the rail shall pass without jar over inequalities in the road, preventing concussions on the axle, relieving the shock of lateral motion, and the jar on the carriage, and furnishing a wheel immensely stronger and longer lived than any rigid wheel now in use. These objects attained, not only are the life and efficiency of railway rolling stock extended and increased and the expense of running trains consequently reduced, but the comfort of passengers and the safety of freight greatly enhanced.

Fig. 1

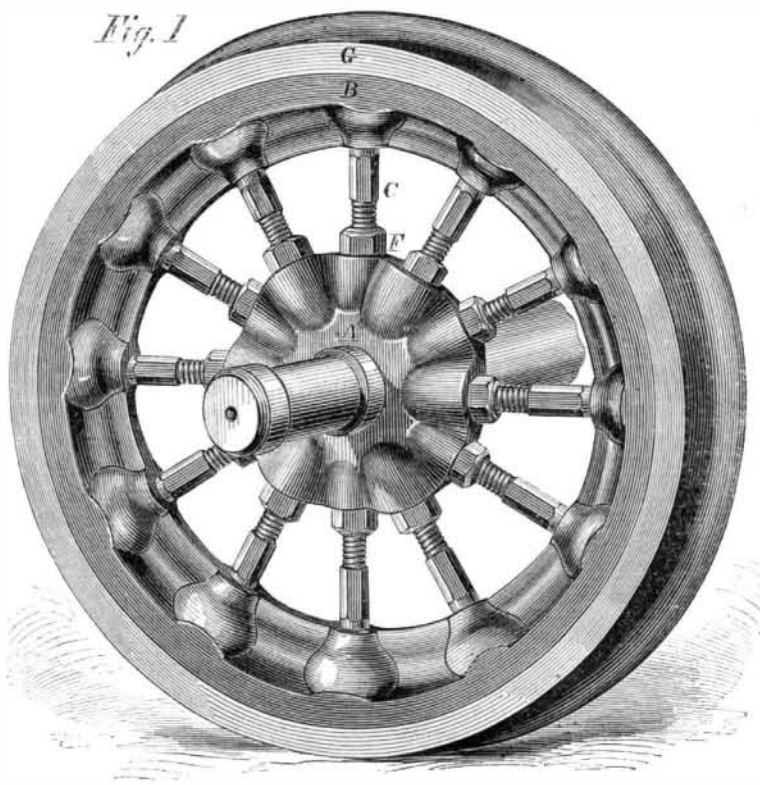
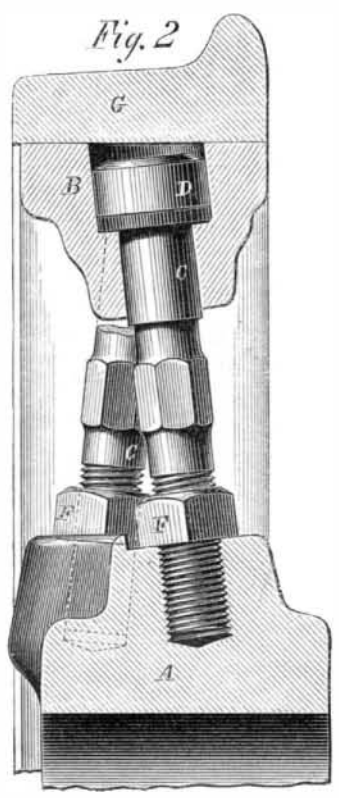


Fig. 2



AYER'S PATENT CAR WHEEL.

Fig. 1 is a perspective view of Ayer's Car Wheel, and Fig. 2 a vertical section from the axle to the tread. The hub, A, and rim, B, are of cast iron, the best stock being used. These are united by wrought iron spokes, C, each alternate spoke leaning at an angle from opposite sides of the central circumference of the hub to the central line of the rim. This is to receive and relieve the lateral shock in running caused by inequalities in the rails or the rounding of curves. The hub is tapped to receive each spoke, which is screwed into it, passing through holes in the rim. Each spoke has a head, D, seated in a recess, and between the under side of the head and the bottom of the recess is interposed a cushion, E, of rubber, between which and the head is a washer of iron or steel. The wheel is trued and the pressure on the elastic cushion adjusted by the nut, F, bearing on the hub; a portion of the spoke being squared, as seen, for the reception of a wrench. The spokes are passed through the rim, screwed into the hub, and the wheel is finished by a tire, G, made of Krupp's best steel, rolled without a weld from a solid ingot.

The weight acting on the hub is suspended from the rim by the wrought iron arms, or spokes, and rests at all times on an elastic cushion. A wheel made on this plan has been found by long trial, under the most exacting circumstances, to wear perfectly round, to withstand uninjured the severest shocks, and to wonderfully increase the comfort of passengers, in the reduction of noise, the absence of jar and jolt, and the additional security from accident afforded.

It is the subject of two patents by Charles C. Ayer, of Lynn, Mass., assignor to himself and Henry A. Breed, of the same place. Manufactured by the New York Steam Engine Company at their works, Worcester, Mass. All orders should be addressed to the Ayer Patent Wheel Company, 126 and 128 Chambers St., New York, where specimens may be examined

Transmitting Steam Power.

At the shops of the Portland and Kennebec Railway a large steam boiler has been put in the wood shop of the company, and from this boiler a three-inch iron pipe leads under ground to the machine shop, a distance of four hundred and fifty feet, conveying steam power for driving two engines of twenty-five and fifteen horse-power, carrying all the lathes and other machinery of an extensive establishment. The pipe is four feet under ground, is inclosed in three-quarter inch hair felting, and encased in a seven-inch box filled with calcine plaster. It has three slip joints to prevent breakage by expansion. When there is a pressure of 80 pounds of steam at the boiler, the same pressure is maintained at the other end of the pipe. The new arrangement is found to work admirably, and will be a great saving in machinery, labor and fuel.—*American Railway Times.*

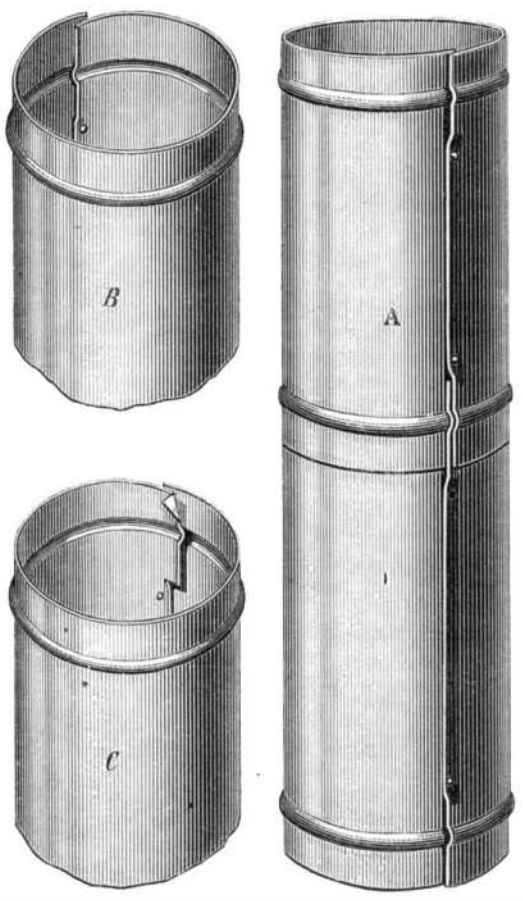
Cheap and Good Smoke-House.

A Western New York farmer publishes his plan of a small, cheap, and good smoke-house, which, as it may contain some practical hints for our readers, we append:

"No farmer should be without a good smoke-house, and such a one as will be fire-proof and tolerably secure from theives. Fifty hams can be smoked at one time in a smoke-house seven by eight feet square. Mine is six by seven, and is large enough for most farmers. I first dug all the ground out below where the frost would reach, and filled it up to the surface with small stones. On this I laid my brick floor, in lime-mortar. The walls are brick, eight inches thick, and seven feet high, with a door on one side two feet wide. The door should be made of wood and lined with sheet-iron. For the top I put on joists, two by four, set up edgewise, and eight and a half inches from center to center, covered with brick, and put on a heavy coat of mortar. I built a small chimney on the top in the center, arching it over and covering it with a single roof in the usual way. An arch should be built on the outside with a small iron door to shut it up, similar to a stove door, with a hole from the arch through the wall of the smoke-house, and an iron grate over it. The arch is much more convenient and better to put the fire in, than to build a fire inside the smoke house, and the chimney causes a draft through into the smoke-house. Good corn-cobs or hickory wood are the best materials to make a smoke for hams. The cost of such a smoke-house as I describe, is about $20."

FAINT'S PATENT STOVEPIPE JOINT.

Most of our readers know something of the annoyance of putting up stovepipes, the difficulty of entering the joints, the liability of their separation while the work is being done, and



the unavoidable smut, arm ache, and temptation to profanity. The plan shown in the accompanying engravings makes the joining of stovepipes as "easy as rolling off a log." By this method the pipes can be joined when the connecting ends are of the same size; the sections are securely fastened and cannot fall apart, and the operation either of joining or taking apart is performed instantly; the joint, when made, is as closely fitting as where one end slides into another; when rusted they may be separated as readily as when clean, and when put together the joint has as neat an appearance as those made in the ordinary way.

A, in the engravings, represents the two sections of the pipe joined. B is one section showing the unconnected or unriveted portion of the seam between the bead and the end, and C is a similar section also open at the seam and having the corner of the inner edge bent to form a stop for the inner edge of B. The difference between a true circle and the opening of the lap at the seam is only sufficient to admit easily the passage of the sheet iron.

In use the two ends are brought together, one edge entered into the opening between the lap of the other, and turned about one-third of a revolution, with a slight endwise pressure, when the parts are securely locked by this simple rotary or spiral motion. With this method there is no necessity for suspending the pipe, unless of very great length between the points of support, as the joints are so stiff that no appreciable sagging takes place.

Patented Dec. 8, 1868 by John Faint. For further information address or call upon John and G. B. Faint, Tremont House, 665 Broadway, New York

A New Alloy for Coin.

The authorities of the mint in France have been experimenting upon zinc for replacing copper, either partially or entirely as an alloy for the silver coinage of the country, and articles of silverware generally. The advantages are said to be that the metal is more homogeneous, has at least as fine a white luster, and possesses a clear ring and considerable elasticity. When toughened by continued or repeated rolling, it is restored by simple heating, and is less liable to be blackened by exposure to the sulphureted hydrogen of the atmosphere, while there is no green coating formed with acid liquids. A mixture of 835 parts of silver, 93 of copper, and 72 of zinc is recommended.

OBITUARY---DEATH OF A NATURALIST.

John Cassin, a distinguished naturalist, died in Philadelphia on Sunday morning last, the 10th inst. Mr. Cassin was born near Philadelphia, September 6, 1813. In 1834 he became a resident of that city, and was, for a few years, engaged in mercantile pursuits. From early youth, however, his favorite study was ornithology, and in his later years occupied his whole attention. He contributed description of new species of birds and synoptical reviews of various families to the Philadelphia Academy of Natural Science. His more elaborate publications are "Birds of California and Texas," a handsome octavo volume, containing descriptions and colored engravings of fifty species not given by Audubon; a "Synopsis of the Birds of North America;" "Ornithology of the United States Exploring Expedition;" "Ornithology of the Japan Expedition;" "Ornithology of Gillis' Astronomical Expedition to Chili;" and the chapters on rapacious and wading birds in the "Ornithology of the Pacific Railroad Explorations and Surveys." His works are the result of careful research, and are especially valuable for their descriptions and classification of many birds not given in the previous works of Wilson and Audubon. Mr. Cassin was of a Quaker family, several members of which have distinguished themselves in naval and military service.

A Novel Method of Catching Mice.

A correspondent of the "Journal of Pharmacy" says: "Having on several occasions noticed mice in our seed barrels, I bethought me of some method how I might trap the little intruders; they having gained entrance by eating through the chime. To kill them with a stick was impracticable, as the little fellows would invariably escape as soon as the lid was raised to any hight. I then thought of saturating a piece of cotton with chloroform and throwing it in, then closing the lid. On raising it again in a few minutes, I would find that life had almost or quite departed. Having on one occasion left the piece of cotton in the barrel, on again returning, found three mice with their heads in close contact with it, and dead. In the evening I saturated another piece, and placed it in the barrel, and on opening it the next morning, to my surprise I found *nine dead mice.*" We recommend our Chicago friends to try chloroform on their rats, and see what effect it will have.

RICE is a valuable crop in Louisiana, a rich planter in St. James Parish, determined to sow rice for the use of his family and his farm hands on about one hundred acres, which he had to spare after planting his sugar cane. His rice crop filled 1,400 barrels, the greater number of which he disposed of on the plantation at $21 a barrel; the entire cost of plowing, sowing, and preparing the grain for market was $4,000. If he had sold all the barrels, which he could easily have done, at $21, his clear profit would have been $25,400.