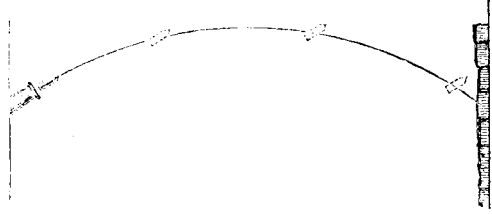


only to elongated shot. A rotating body tends, by inertia, to preserve the line of its axis parallel to itself. Hence an elongated bolt, fired from a cannon at any elevation, does not bend its head downward along the curved line of its flight, like an arrow, but continues throughout its flight in a position parallel



with that of the gun. When it strikes a wall, therefore, it does not strike it directly endwise, but at an inclination; diminishing very materially the force of its impact.

The manifest mode of making a shot perfect is to turn it in a lathe, so that its form will be symmetrical, and then to balance its weight around the axis of its mass. One simple plan of balancing the weight would be to drill four cavities in the lower or rear end of the shot, plug them with wood, and then drive nails into the one on the lightest side, till the shot would balance on the centers on which it was turned. There are, doubtless, better modes, and we leave the matter in the hands of our ingenious inventors.

WEALTH—A REVIEW OF THE SUBJECT.

Our articles on wealth have been so scattered along the weeks, that it may be well to make a brief summary of the truths already examined, before we proceed to the consideration of others.

We have seen that wealth and money are by no means synonymous terms. Money forms but a very small portion of the wealth of the world. This consists of houses, fuel, clothing, ships, machinery, horses, carriages, books, pictures, and all the other countless articles of value, which contribute to the gratification of human wants. Wealth is produced by making changes in the form or location of substances which adapt them in some way to our service. It is consumed by effecting changes in the form or location of substances which render them less fit for our uses. Wealth is in constant process of production and consumption, articles of value being eaten up or worn out, while others are being made to take their places. In most communities, more property is produced each year than is consumed, and thus the wealth of the world is constantly increasing. It will be observed that this property is increased, not by bringing money into the country, but by building manufactories, railroads, dwellings, &c., and by increasing the stocks of merchandise in our warehouses, the numbers of cattle on our farms, &c. If the State of New York was surrounded by a wall a mile high, so that no man could come in or go out, the community might increase its wealth hundreds of millions of dollars worth, without ever having one dollar of money either made or brought within its borders.

When a man accumulates property, he does not get it out of other people. If a man saves a little capital from his earnings, so that he is able to erect a saw mill or a small manufactory, he thus harnesses the great forces of nature to aid him in the production of wealth. The productive power of the laborers whom he employs is facilitated by improved tools or machinery, their labor is more profitably directed, and thus the property which the manufacturer accumulates is that which he has himself created. And not only so, the persons who work for him do so because they get a little better pay than they could elsewhere, or because they find some other advantage in the arrangement. Those who sell him the raw material make a profit in the trade, and those who buy the manufactured article are induced to make the purchase from some advantage in price or convenience which it presents to them. Thus the successful manufacturer not only increases his own possessions, but his operations are a pecuniary benefit to all with whom he has transactions; and he impoverishes no one. On the other hand an unsuccessful manufacturer, not only loses his own property, but he generally, by contracting debts which he is unable to pay, diminishes the property of other people. By the unwise direction of his operations he diminishes the wealth

of the community. That which is true of manufacturers is also true of merchants and other business men: the successful money-maker increases the wealth of the community beyond the amount of his own accumulations, while the conductor of unsuccessful enterprises diminishes the wealth of the world to an extent greater than the amount of his own losses.

A Model Specification and Patent.

The following is a verbatim copy, from the records of the Patent Office, of a patent actually granted on the 3d of April, 1860. This patent was not secured through the Scientific American Patent Agency, and the name of the soliciting attorney is unknown to us. To all whom it may concern:

Be it known that J. Samuel Armitage, of the city and county of St. Louis, and State of Missouri, have produced a new and original design, to be printed upon paper, and used as a trade mark upon a certain article of manufacture known as "S. Armitage's Neuralgic Pills;" and I do hereby declare that the following is a full, clear and exact description of the same, reference being had to the annexed drawing, making part of this specification, and to the letters of reference remarked thereon.

The aforesaid design consists of a picture which represents the interior of a room in a dwelling house, in which are assembled a number of persons, some of whom appear to be sick; it also represents the interior of a saleroom in which some persons are assembled, one of whom appears to be selling something to the others; and the said picture also represents the interior of a work shop in which a person is seen mixing some kind of a composition in a kind of pot, with a muller or stick.

Each of the aforesaid representations is surrounded with a border, which separates them from each other, so as to make each representation appear distinct in itself, while they each constitute a part of the whole.

In that part of the Picture which represents the room in the dwelling house are seen five persons, all females, one of whom is in bed and appears to be sick with pain in the head; this person is marked R. Another one of the said persons is seen reclining in a Rocking chair, and appears to be sick also with pain in the head, which she has tied up with a cloth; this person is marked J. She is sitting by the side of a table, and in front of her, and on the opposite side of the said table, there are two other persons, marked T and P, that appear administering to her wants.

And behind the person marked J, there is a person marked D, who appears to have just entered the room, and she appears to be clapping her hands for joy, she having heard of Armitage's Neuralgic Pills.

To the right of the figure marked P, there is a window, and under the said window there is a table, and under the said table there is a cat marked L.

In that part of the Picture which represents the sale room, there are three persons seen, marked A, B, C; the person B appears to be selling Pills to the person A, and the person C appears to be waiting to purchase some of the said Pills.

In that part of the Picture which represents the work shop, a person marked B is seen, who appears to be mixing some kind of a composition, in a kind of pot which stands upon a table by the side of which there stands another pot. To complete the aforesaid, the words "S. Armitage's Neuralgic Pills" are inscribed over the said Picture, and at the side of it the words "A sure cure for Neuralgic affections" are inscribed.

What I claim as my production is the aforesaid design, consisting of Picture shown and described, in combination with the words "S. Armitage's Neuralgic Pills," and the words "a sure cure for Neuralgic affections;" all of which I respectfully submit.

Witness:
E. C. HUSSEY.
CHAS. SPIEGLE.

SCHOOL PRIZES.—Mr. M. Y. Beach, a wealthy citizen of Wallingford, Conn., offered last year a series of monthly money prizes for competition among the scholars of the various schools in his village, under the direction of the Board of School Visitors. There was a prize for the most punctual scholar in attendance, another for the most neatly kept and written copy-book, another for the best speller, and so on. The prizes varied from \$1 to \$1.50 per month each. The public award of the prizes has lately been made by the Board, and the New Haven Register describes it as having been a very interesting occasion. The scholars all joined in a procession, headed by a band of music, and proceeded to the town hall, calling en route at the mansion of the donor. At the hall, suitable addresses were made, and a spelling tournament took place between the scholars for which special prizes were given. The greatest excitement prevailed among the juveniles, lads and misses. The teachers of the various schools all united in stating that this system of prizes had produced a very beneficial effect upon their pupils, that it had encouraged them to effort, and there had been a marked progress in study in all the competing classes.

PATENTS FOR THE FORM.—Under the new law the new form of any article may become the subject of a patent, as well as the mechanical construction. In some cases, therefore, an applicant may secure a species of double protection upon an invention, taking one patent upon the mechanical construction and another upon the form.

Recent American Inventions.

The following inventions are among the most useful improvements lately patented:—

LITHOGRAPHIC PRESS.

The object of this invention is to obtain a lithographic press that may be operated by steam or other power than manual, so that the work may be done much more rapidly and economically than by the ordinary hand press. The operation of the press is substantially the same as that of the hand press, the parts being so arranged as to be actuated automatically by the power employed. The inking device, as well as the moistening apparatus, require no special care or manipulation on the part of the attendant, while the arrangement of the parts is such as to insure durability as well as rapidly and uniformly in the work produced. This press will doubtless create a revolution in lithographic printing. It is the invention of Robert McNie, of New York City.

PASTEBOARD DRYING FRAME.

In curing or drying paper board, or pasteboard as it is frequently termed, the plan hitherto practised has been to take the sheets, as they pass from the cylinder of the machine, and lay them on the ground, that is, when the weather is favorable for drying. This plan is attended with considerable difficulty, as the sheets as they are taken from the cylinder are very heavy, weighing about three pounds, two of which are water. In this wet state the sheets are very tender, and require to be handled with the utmost care. This mode of curing or drying the sheets is attended with considerable expense—about \$5 per ton—and can be practised only a small portion of the year. The object of this invention is to facilitate the handling or conveying of the wet or green board, so that the same may not be injured by manipulation and the necessary work performed rapidly, the invention also admitting of the boards being dried by artificial heat in a revolving cylinder, or by means usually employed for drying other articles. This invention consists in placing the wet or green boards, as they are taken from the cylinder of the machine, within portable frames, whereby the sheets are fully protected while drying, and will admit of being carried or conveyed with perfect safety from place to place, as may be required during the process. This invention was patented by James H. Patterson, of Schaghticoke, N. Y.

SKATE.

This invention consists in making the skate iron or runner in two parts, jointed together by a transverse joint of a suitable description, and furnished either with an elastic or a divided stock or footstand, so that, when the skate is strapped, or otherwise secured to the foot at the toe and heel thereof, the joint in the skate iron will allow the front and back parts of the footstand to accommodate themselves to the motions of the foot. The credit of this contrivance is due to A. J. Gibson, of Worcester, Mass., who has assigned it to T. G. Bancroft, of same place.

BAROMETER.

This improved barometer consists of a balance beam having a long arm, composed wholly or for the most part of wood or other light substance, and a short arm composed for the most part or wholly of metal, or other heavy substance, with a poise to counterpoise the longer arm. By reason of the lesser specific gravity and greater bulk of the longer arm as compared with the shorter one, the balance is caused to oscillate with variations in the pressure of the atmosphere, and so to indicate the pressure upon a suitably arranged and graduated scale. The patentee of this invention is J. A. Gridley, of Southampton, Mass.

HYGROMETER.

The awns of certain grasses, for instance those of the order *Stipa*, are naturally of twisted structure, and have a natural tendency to twist and untwist themselves, as the atmosphere in which they are exposed becomes less or more moist. This invention consists principally in the construction of a hygrometer by applying the twisted awn of any of such grasses, or any portion of such awn, to constitute the axis of an index suitably arranged in relation to a concentric graduated dial. It also consists in the employment, in combination with an axis composed of the twisted awn, of two indices, so applied at a distance apart that the differential movement of said indices shall serve to indicate the hygrometric condition of the atmosphere. The patentees of this invention are A. H. Black and C. R. Black, Indianapolis, Ind.

MACHINE FOR TURNING OVAL FRAMES.

The object of this invention is to admit of a rotary cutter or a stationary chisel being used to cut out oval frames automatically, or without the usual manipulation of a cutter as used with the ordinary oval lathes. In order to turn or cut out oval frames with a rotary cutter head or a stationary chisel, it is necessary that the cutter or chisel have a position at right angles with the face of the work at all points of the rotation of the latter, in order that the moldings or beads may be cut perfectly. This result cannot be obtained by an ordinary oval lathe, as the work in such a machine has a rotary motion only, and the cutter head would have, at certain points of the rotation of the frame, an oblique position with the face of the work, and the moldings and beads of the lathe would be destroyed. To obviate this difficulty, the bed of an ordinary oval lathe has a vibratory movement given it simultaneously with its rotating one, whereby the position of the work changes relatively with the cutter head or chisel, so that the latter will at all times have a position at right angles with the face of the former. This invention was patented by Isaac P. Tice, of Baltimore, Md.

THE POLYTECHNIC ASSOCIATION OF THE AMERICAN INSTITUTE.

[Reported for the Scientific American.]

The usual weekly meeting of the Polytechnic Association of the American Institute was held, at their room, in the Cooper Building, this city, on Thursday evening, March 28, 1861—Professor Mason in the chair.

COMPRESSED AIR AS A MOTIVE POWER.

W. S. HASKINS read a paper on the above subject, maintaining the practicability of the use of compressed air locomotives for city railroads more especially. He adverted to the experiments of Baron Van Rathen and Arthur Parsey on the subject, and their results, as compared with the use of steam locomotives, which were summed up as follows:—

1. A reduction of 20 per cent in the cost of locomotives.
2. A reduction of one-third in the number required for service.
3. A reduction of three-fourths of the present expenses for repairs.
4. A saving from increased durability in the ratio of 50 to 1.
5. A saving of one-third of the fuel.
6. A saving of water.
7. A reduction of three-fourths in the washing and cleaning.
8. A reduction of the workshop expenses.

Total saving on prime cost amounting to one-half, to which may be added an immense saving in construction account.

The difficulty arising from supplying the power at stations, without sensible loss of time, had been obviated by a method recently devised and patented. It was now entirely practicable, in the opinion of the writer, to apply compressed air to city routes not exceeding eight miles in length, replenishing at the ends of the route. It had also been demonstrated that single cars could be propelled by this power over steeper grades than are now traversed by horse cars. The writer referred to a recent report by Thomas D. Stetson on the subject, giving a summary of the advantages of this mode of locomotion over steam.

The PRESIDENT believed that the most effective mode of propulsion would have to be adopted in this city, and whatever that mode might be, the least desirable would be found to be horsepower, which would be abandoned. He suggested that the report be referred to a committee, and a motion was made and adopted accordingly. The gentlemen appointed on the committee were Messrs. Fisher and Johnson.

NOVELTY CHURN.

J. E. WALTER exhibited a churn patented in 1859. Sweet milk is churned at a temperature of 62° inside of five minutes, leaving the milk as sweet after churning as before. The milk is taken just after the animal heat has left it, and put into the churn. The churn has a double bottom; milk is put into the upper chamber and water in the lower one. In cold weather warm water is put in. A thermometer fixed in the end of the box indicates the temperature which should be 62°; when the milk has reached that exact temperature the warm water is drawn off and the churning

commences. The churning is done by two shafts, with 24 corrugated dashers each, making 10 revolutions to one revolution of the crank outside. Cream can be churned as well as sweet milk; but sweet milk, after being churned, will retain its sweetness from three to five hours.

Mr. DIBBEN inquired if this was any different from other plans for violent agitation.

Mr. Walter said that it was; in this the temperature was kept at 62°, which was found to produce the best butter.

The PRESIDENT—In order to have this matter tested, I will try the churn at my place a few weeks and then report on it myself.

HERMISED INDIA-RUBBER.

Mr. SEELY said that he had recently visited an india-rubber factory at Beverly, Mass., where he learned some very curious facts in relation to that manufacture. India-rubber had been known about a hundred years, and only within the last twenty years had it been found of much practical use. Very few people knew why it was that india-rubber possessed the property of rubbing out pencil marks. It was generally supposed that it was done simply by friction, but a better explanation was that the rubber, becoming electrified by rubbing, attracted the powder of the pencil. As to the discovery of vulcanization, to which was due the present extensive use of that article, and without which it was almost good for nothing, Charles Goodyear had the reputation of it in this country and Charles Hancock in Europe; and though Mr. Goodyear was scarcely known in Europe in connection with the discovery, yet Mr. Hancock admitted that he was led to the discovery of his method of vulcanizing by a piece of india-rubber that he had received from America that had been subjected to such a process. In the town of Beverly, Mass., for some years past, there was a manufacturing company that used a devulcanizing process, taking old rubber and making it up chiefly into india-rubber cloth, under a patent with which Goodyear's did not interfere. And for the last four years they had been working the raw rubber by a process of vulcanization without the use of heat, as required in Goodyear's patent. The rubber is put into a solution of chloride of sulphur and sulphuret of carbon, and the change is effected in its properties in a few minutes. This process was called hermising, to distinguish it from vulcanizing. The patent was Mr. Parmalee's. The hermised rubber possesses substantially the same properties as the vulcanized. It has the advantage, however, of being made of a lighter color, and therefore of receiving quite brilliant tints. The lighter color arises from the fact of rubber being less exposed to the atmosphere during the process, which exposure in Goodyear's process turns the product almost black; and to make it lighter, zinc white or some other kind of white material is required to be added. Mr. S. exhibited some very beautiful specimens of colored rubber made by this new process, and, among others, a globe containing a map of the world, which, the President said, Goodyear, after much experimenting, was unable to produce. Mr. S. also exhibited some milk of the rubber tree, ammonia being added to it to preserve it in a liquid state. The milk in the bottle was perfectly white.

The PRESIDENT stated the fact that india-rubber car springs were passing out of use. It was found that the jolting of the car caused the india-rubber at last to lose its elasticity.

Mr. CHURCHILL exhibited some pieces of vulcanized rubber which had been subjected by him to the action of steam for the space of about three hours. The result was that the rubber was perfectly brittle.

SELF-ADJUSTING SUBMISSIVE SPRING.

J. M. FORREST, of Virginia, exhibited and explained a carriage-spring with the above title, which he had patented. It consists of several leaves of steel, like the elliptic spring, but the form is entirely different. The advantages claimed over the elliptic spring are these:—First, there is only one hole drilled through the leaves, which is necessary to fasten it, with the addition of two clasps to the axletree; second, there is no welding, and therefore it is less troublesome to the manufacturer; third, the spring divides the weight equally on the axletree, thereby rendering the axletree less liable to break; fourth, it is self-adjusting, springing its entire length with a light weight; fifth, it is rendered submissive by a cross bar attached by hinges to the end of each spring;

sixth, it weighs much less than the elliptic spring, and therefore costs less. Mr. Forrest stated that he had ridden in a carriage with a spring weighing only fourteen pounds, driven the horse, and written a letter at the same time. He regretted to say that he had to come North in order to get the springs made, and he did not succeed in finding a man who could make what he wanted till he got to New Haven, where he found a very ingenious Dutchman that did it.

STEEL-PLATED SHIPS.

Mr. STETSON adverted to the report that the Emperor Napoleon had countermanded the order for the construction of steel-plated ships, and said that that report needed confirmation before it should be credited. Sir Howard Douglas had taken the ground that iron-plated ships would not be able to withstand the immense force of modern projectiles. Other authorities were almost unanimous in the opinion that they were destined to create a revolution in naval warfare. France and England were now changing wooden for iron vessels. When ship was matched against ship, there would be no question as to the superiority of the iron-plated vessels. With regard to land batteries, however—earthwork, timber or masonry against plated ships—it became a different question. Timber ships were not expected to resist cannon balls. What would be the result with iron-plated vessels? If a ten, fifteen or twenty-inch cannon ball would make a hole sufficient to drive a horse and cart through in consequence of the crushing in of the iron, then it would become a grave question whether iron plates were practicable. Mr. Stetson referred to an attack on a fortress in the Crimea by three French iron-plated vessels, where the fortress mounted more and heavier guns and more men, and yet the attack was successful.

The PRESIDENT inquired if the result of the modern improvements in warfare would not be that fortresses would be found to be more than a match for ships, causing them to stay at home.

Capt. BARTLETT, of the United States Navy, thought that question could be answered by the fact that the introduction of the Colt pistol had not made men any more peaceable, but the reverse. As to iron-plated vessels, he considered them vulnerable at the two ends, where they were not plated. General James, of Rhode Island, had succeeded in making a cast iron shot, of the Minié rifle ball character, and had, as he thought, perfected it. The iron shot was made explosive—that is, so as to explode when it strikes the object at which it is fired. The practical effect of this invention was to render a 24-pounder Columbiad equal to a 48-pounder, without adding one ounce to the gun, and it would last longer and fire further than if used for round shot. The rifling of the gun could be done without taking it to the foundry. The shot was cast hollow, and was provided with a plunger and percussion cap. He had seen a shot fired at a sand-bank, and it exploded at the instant of contact. And yet one of these balls could fall 30 feet and not explode; so that they could be handled and used with safety. These shot could be fired on the water, instead of at the side of the ship, just under its steel-clad sides, and the vessel thus destroyed. As regards the effect of heavy ordnance, he had seen a 12-inch shot fired from the "Peace-Maker," now at the Brooklyn Navy Yard, a distance of 658 yards, on a dead level, and it went clear through a ship, making a hole on the other side big enough to drive a horse and cart through.

The same subject will be continued at the next meeting, which will be on Wednesday evening, April 3, to which time the Association adjourned.

IN order to use water economically as a motor, where a single turbine wheel is employed, and different degrees of power required at different times, it has been ascertained that the wheel should be varied in capacity to suit the power required, and the volume of water admitted to it. To this end inventors are at present actively engaged, and many ingenious plans have been devised, some of which promise well.

THE ENGINEER-IN-CHIEF OF THE NAVY.—Mr. Benjamin F. Isherwood has been appointed Engineer-in-Chief of the Navy. The appointment is an excellent one, and gives general satisfaction. Mr. Isherwood is the author of "Engineering Precedents," which has attracted so much attention.