Molded Cast Steel Plows.

Owing to the peculiar adhesive nature of the soil on our western prairies, steel plows polished as bright as mirrors, are generally used for plowing. Hitherto all the steel plows made for the west have been formed of rolled sheet steel of uniform thickness, the different parts being cut out of the sheets, then forged and fitted together. Such steel did not provide for the unequal wear of different parts of plows, and as a consequence some of the parts, such as the heel of the landside, the sole of the point, and the underside of the moldboard would be worn out, while the other parts were nearly as good as when first made. An important improvement was patented by F. F. Smith, on the 20th of November last, which will, in our opinion, revolutionize the entire manufacture of steel plows for the west. This improvement consists in forming the sections of such plows of molded cast steel, the parts being so cast as to have the greatest thickness of metal where the plow is exposed to the greatest wear. A much greater amount of steel is therefore cast in the exposed part of the point, the landside, and the moldboard thus rendering such plows not only much more durable, but much stronger. As each section of such a plow is cast alike, farmers can keep duplicates on hand, and replace them without employing a blacksmith, which cannot be done with forged plows.

As the castings of these plows are made by pouring steel into iron molds, the surface of the metal becomes much harder and wears longer than common hardened steel. Each plow is adjustable for either two or three horses, and Western farmers, we believe, will find them deserving of general adoption. They are manufactured by Collins & Co., Collinsville, Ct., where the inventor resides, and specimens may be seen at No. 212 Water street, this city, where we examined them a few days ago.

New Pilot Boat.

The New York pilots are distinguished all the world over for their skill, daring, and enterprise, and their boats have an unrivalled reputation for beauty of model and great speed. They are really yachts so far as model and rig can make them, and a strong feeling of emulation exists among our shipbuilders to construct, and our pilots to own and sail, the best and fastest pilot boats. The New York pilot craft were in fact our first American yachts, as they furnished the original models for the very swiftest of such vessels. The first trip of a new pilot boat, therefore, is an event of considerable interest to our shipbuilders and pilots, and such an occurrence took place on the 11th inst., in the case of the *Wm. H. Aspinwall,* a new pilot yacht of beautiful model, built by Vandeusen Bros., at their yard, foot of Eighteenth-street, E. R. This vessel is schooner-rigged, 100 tuns burden, 75 feet in length, 19 feet 6 inches breadth of beam, and 7 feet 10 inches in depth. Her owners and pilots are Captain Walter Brewer, Gideon Mapes, Wm. H. Anderson, Geo. Burger, and John N. Dale. She made a run out of 26 miles, sailing around the lightship, and returned. The trip was considered highly successful and gratifying to the builders and the pilots in all that relates to superior speed, obedience to the helm in steering, and other qualities which constitute a good sea boat.

Inventors in Seceding States.

Applicants for patents in South Carolina, Georgia, Louisiana and other seceding States, experience a difficulty in executing their papers from not being able to find an officer who will administer the oath of citizenship required of inventors. Many worthy inventors residing in these States have had their papers prepared for the Patent Office, and while some have no compunctions in regard to taking the oath of citizenship, they cannot find a Justice of the Peace in their vicinity to administer it. Others regard themselves citizens of another republic, and write to us that they cannot conscientiously take the prescribed oath.

To the latter class we have no advice to give; but to the class who would take the oath of citizenship could they find an officer to administer it, we would suggest to such that, by stepping into an adjoining State, where the ordnance of secession has not passed, they will have no difficulty in finding a Justice of the Peace, judges, or clerks of some courts, before whom they can execute their papers, which transaction will hold as legal as if they had been executed in the State and county in which the applicant resides.

THE POLYTECHNIC ASSOCIATION OF THE AMERICAN INSTITUTE.

[Reported for the Scientific American.]

The usual weekly meeting of the Polytechnic Association was held, at its room in the Cooper Institute, this city, on Thursday evening, Feb. 21, 1861—Professor Mason in the chair.

Mr. JOHNSON proposed the subject of Soluble Quartz for future consideration.

Mr. ENGLEBRIGHT proposed, subsequently, the subject of "Ventilation."

VENTILATION.

Col. RUTTAN, of Canada, presented some of his views of ventilation, and exhibited drawings in illustration. As to the necessity for ventilation, all were agreed upon that. The question was merely as to the *modus operandi.* Perhaps no man living had expended so much time or money in experimenting upon ventilation as he had. He had come to the conclusion that the principles upon which ventilation is usually based are wrong *ab initio.* The common method is to ventilate by mechanical, and not by natural means; and the mechanical means are a departure from nature in this wise, that they are predicated upon the theory that hot air naturally goes upward. That is not the fact. Air has weight; and heating it does not deprive it of its weight. Hot air, therefore, naturally goes downward. It usually goes upward, because we usually allow cold air to force it up. If we provide means for taking the cold air from under it, hot air will fall as certainly as lead. Warming a house by a true ventilating process is the cheapest and most healthful mode. When a man's feet are cold, he is cold all over; and when his feet are warm he is warm all over. The method which he would propose, founded upon the true theory, was substantially this. The floor joists are to be furred off about two inches, so that there shall be a connected stratum of air between the floor and the ceiling below. This air chamber communicates all around the edge of the room with the room, and communicates also with the chimney or ventilating flue. This stratum of air effectually prevents cold feet; for even if it should sink to 40°, the feet being always covered with leather and woolen, the natural heat of the body will prevent them from becoming cold. The air is warmed in the hall, and admitted into the room at the top. It is not necessary that it should feel warm to the hand; for air at 90° will feel cold to the hand, and yet will warm a room sufficiently. The chimney acts as a pump drawing out the cold air first from the space between the floors and then from the lower part of the room, while the warmer air in the upper part of the room falls to take its place, and the heated air rushes in to fill the vacuum in the top of the room. It is not necessary that rooms to be heated should be immediately connected with the hall. He had warmed a room where there were two intervening rooms which were not warmed. The cold air being drawn off from the third room only, the warm air passed through the other two rooms along the ceiling, being buoyed up by ths cold air in them, and entered and warmed the third room.

The PRESIDENT—How do you ventilate cars?

Col. RUTTAN described the process for winter and also for summer ventilation, in each case the air being drawn from the lower part of the car and being supplied above.

Mr. STETSON said that, in the ordinary ventilation, taking the air from the top of the room, as the heated air immediately rises to the top of the room the lower part of the room is poorly warmed. In a car, he had found a thermometer to stand at 110° at the top of the car and at zero at the bottom. While our heads, therefore, suffer from the heat, our feet are cold. Col. Ruttan's process always takes out the coolest air in the room, which is not only the greatest economy, but allows the room to be completely filled with the warm air.

Mr. JOHNSON inquired what was the economy of fuel?

Col. RUTTAN stated that he was warming his house in Canada—a two-story house—at an expense of 25 cents per day, using coal at $5.50 per tun. The ceilings were altogether too high for that climate; for in a cold climate, they should never be higher than 9 feet. It takes considerably more than double the fuel to heat a room 12 feet high than if it were 9 feet. The open stairway, which is copied from southern Europe, is totally unsuitable for a cold climate. Every staircase should be so closed as to prevent the air from going up to warm portions of the house where the heat is not required. With a close hall, low ceilings and a true ventilation, you may defy the cold and the doctors too.

Mr. GARBANATI regarded the saving to the health as being by far the most important advantage of the proposed system of ventilation. It cannot be healthy to have the feet in an atmosphere so much lower than that which surrounds the head. What is needed is a system of ventilation which equalizes the heat, as this system claims to do.

COTTON AND SUBSTITUTES THEREFOR.

The subject for the evening, the "Mechanical and Chemical Properties of Cotton, and Substitutes Therefor," was then taken up.

Mr. STETSON said that the first reason why cotton was so extensively used was its cheapness. Nature produces this fibrous material ready to our hands, and all that we have to do is to reach forth our hand and take it. There is no rasping, or pounding, or grinding necessary to prepare it. Another reason is the uniformity in the length of its fiber. Different varieties have a fiber of different lengths, that of the Sea Island cotton being long and fine. The average of upland cotton is about three-quarters of an inch, and the variation between the length of the different fibers of the same variety is less than one-fourth of an inch. Other materials, as hemp, have a much longer fiber, which is convenient in coarse work, but will not answer for the purposes to which cotton is applied. In the manufacture of cotton it is passed through a series of pairs of rollers, each revolving twice as rapidly as the next before it, which draws it out to a great length and with uniformity. No other fiber can be drawn out upon that principle to the same extent. After being passed through the rollers once, a dozen or more threads are placed together and passed through again; and so on, until each ultimate strand of cotton thread has been passed through several thousand times. Another property of cotton is its adhesiveness, which gives it strength and enables us to draw it out to extreme fineness.

Mr. PELL read a paper upon the history and character of cotton, flax, hemp and other fibers. The filaments of cotton are from half an inch to two inches in length, and less than the two-thousandth part of an inch in diameter. Cotton entirely fails 425 miles from the salt water. Its qualities are length of fiber, fineness, softness, strength, equality of filaments and freedom from impurities. By means of a powerful achromatic microscope, it may be seen that, while the fibers of flax are cylindrical and jointed like a cane, those of cotton are flat, not jointed, and twisted similar to a corkscrew. Cotton may be distinguished from all vegetable fibers by this corkscrew form. Among the plants yielding fibers of sufficient strength to be made into thread are the golden rod, the sunflower, the nettle, the swallow wort, the broom, the aloe, and sundry plants of the lily tribe. Wool has many advantages over all other materials used for clothing. It is a much better non-conductor of heat than cotton or linen, and when worn next the skin, tends to preserve us from sudden changes of temperature, and also from malaria and epidemic influences. Of all known fabrics, silk is the most conspicuous. Two pounds of cocoons will produce a thread 1,176,000 feet long. More than 1,600,000 people derive their entire support from the culture and manufacture of silk.

Mr. SEELY said that attention had been called only for a few years to the chemical nature of cotton. Gun cotton, when first known, was generally considered valuable as a substitute for gunpowder. This idea has now been abandoned; but it has certain advantages, which will still make it valuable for particular cases, perhaps, for instance, in charging shells. It is unaffected by moisture, is more explosive, is more easily prepared, and the materials may be more readily obtained. But gun cotton has another value, for it is the foundation of the art of photography as it now stands. It has been suggested that cotton should be dissolved in hydrocholoric acid, that any desired form should then be given to it and the acid evaporated. This can be done, but the cotton thus precipitated has no strength. Its strength is caused by its fibers. The composition of cotton, sugar, starch, gum arabic, dextrine and woody fiber is chemically the same, O_{12} C_{10}

H_{10}. Gun cotton is chemically different. Two or three atoms of hydrogen are taken away and two or three atoms of the peroxyd of nitrogen, NO_4, are substituted. Yet this change does not affect the appearance of the cotton, even when examined by the most powerful microscope. But upon trying it with the polariscope, we find that the effect upon polarized light is precisely the reverse of that produced by the ordinary cotton. Dr. Van der Weyde states that he has converted cotton into sugar. The cotton is boiled in an acid for some time. First it is changed into dextrine, and then into sugar; but it is grape sugar, and will not crystallize. The composition of sugar is nearly the same as that of cotton and woody fiber; it is O_{12} C_{12} H_{12}.

Mr. PELL stated that in Lowell, within the last year, a pound of cotton had been spun into a thread 358 miles long.

Mr. SEELY had seen a statement that, in England, 1,096 miles had been reached; but that seemed hardly credible.

Mr. BABCOCK said that cotton is also valuable because it is soft and elastic, and hence it is used in cushions and for similar purposes. It is also used in a form in which it is harder than iron itself, for the rollers of calendaring machines. Compressing cotton by hydraulic pressure, a roller is produced so hard that it can be turned like iron in the lathe, and forms a polished, smooth surface, so hard and elastic that, even with a sledge hammer, no permanent indentation can be made. The rollers are manufactured in Providence, R. I.

Mr. GARBANATI remarked that as wool could not be profitably grown for clothing alone, and the demand for the meat is limited, wool must be limited in its production. Silk is expensive, and must be confined to special uses. Flax is objectionable because it is too good a conductor of heat to be worn next to the skin. Hence it is important to find some substitute for cotton, so that we may not be dependent upon a single locality for our principal clothing material.

Mr. DIBBEN expressed the opinion that cotton is naturally more durable than flax, hemp and similar materials, because the latter are not in their growth exposed to the weather, and hence not protected from it; while cotton and wool are naturally weather-proof.

Mr. BUTLER explained the practical operation of cotton spinning, in order to show the difficulties in the way of the introduction of any new material. Cotton machinery, as a whole, is more perfect than any other machinery in the world. The cotton can be picked from the plant, and in 24 hours woven into cloth; and this cannot be done with any material requiring rotting, hatcheling, mixing up, or such processes. As time is money, this is an important consideration. If a manufacturer were to have five per cent of Sea Island cotton mixed with the medium upland to which his machinery is adapted, he could not use it. The fibers being too long, would be broken by the rollers. It would take a century to produce complete working machinery for a substitute for cotton.

Mr. PELL prophesied that, in less than fifteen years from this time, flax will be used wherever cotton is now used for a mixture with woolen. He described a steam cannon, 20 feet long, which would instantaneously convert flax into a substance so nearly resembling cotton as to be indistinguishable from it without the microscope.

Mr. J. R. HASKELL exhibited specimens of the flax cotton produced by the process just described. He had tried it with cotton machinery, and had came to the conclusion that it would not answer for that. Upon mixing it with wool, half and half, it worked as well as cotton; and he had been told that the article thus produced was superior to all-wool, being susceptible of a higher finish. In woolen machinery, in all probability the flax cotton could be spun into threads alone. Satinet has the warp of cotton and the filling admixture; he should propose to have the warp and filling alike, half flax and half wool.

Mr BUTLER thought that, for admixture with wool, this flax cotton would be valuable, but not as a substitute for cotton. He would not discourage its production by any means. The fibers range from half an inch to three inches in length, which would not do at all for cotton machinery. The samples exhibited he should judge to be weaker than cotton.

Mr. HASKELL stated that the mode of producing that cotton is this. The cannon is filled with flax and water, under a considerable pressure, so that the moment the pressure is removed the water flashes into steam, completely separating the fibers of the flax from each other, as the whole contents are discharged into the atmosphere. A second operation had been proposed, but seemed unnecessary.

The same subject was continued for the next meeting, and Professor Mason expressed his intention of making some remarks upon it.

Mr. Pell and Professor Mason also expressed their intention of taking up the subject of "Projectiles" during the hour for miscellaneous business.

On motion, the meeting adjourned.

Recent American Inventions.

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

HYDRANT.

The desiderata in an invention pertaining to hydrants and which this invention is designed to supply are, first, that (in our climate) the operating parts be so arranged that the water, when at rest, will be perfectly protected from frost; second, that no water be allowed to run to waste, both on account of its value and the damage waste water is liable to cause to the premises near which it may be discharged; third, that the hydrant re-act automatically, that is to say, be self-closing, so that the water may not be left running, either by evil design or carelessness; fourth, that it shall, by its own operation, keep itself free from all sediment, or, in other words, be self-cleaning; fifth, that it shall not require to be removed from the ground in order to effect any repair it may need; sixth, that it may be opened with facility or with a small effort of strength; seventh, that it may close in such a manner as to produce the least possible strain or shock to the back pipes; eighth, that it may be convertible, at will, into a fire hydrant, a street or garden sprinkler, or a window washer, by simply attaching a hose; ninth, that nothing can be introduced into its interior, to obstruct the action of its mechanism; tenth, that it be compact, free from external projections or prominences, that it will not be exposed to external accidents, and be capable of being conveniently adjusted in the desired position; eleventh, that it open with the same ease, re-act or close in the same manner, and be equally durable, under all pressures; and, twelfth, that no particular one of its parts be subject to a relatively excessive or special wear, By this invention, patented by James P. Kenyon, of Brooklyn, N. Y., it is believed that the above-named advantages are fully secured.

APPARATUS FOR SIZING SILK, &C.

This invention is intended more especially to be used in connection with that kind of apparatus for gaging or determining the size of a thread, which constitutes the subject-matter of Letters Patent granted to John E. Atwood, dated April 12, 1859, but may be, for the most part, applicable in connection with other gaging devices. It consists principally in certain devices constituting a stop motion, employed in combination with a bobbin on which the thread is taken up from the gaging apparatus, for the purpose of stopping the drawing of the thread through that apparatus on the occurrence of a variation in size beyond certain limits, so that by the use of two or more bobbins, each to take up all the thread between certain limits, and the changing of one for another whenever the stop motion acts, the sorting into as many different thicknesses between certain limits as may be desired, or, as it is technically called, "sizing" is effected. This apparatus was patented by John E. Atwood, of Mansfield Center, Conn., and Lewis Leigh, of Seymour, Conn.

GRINDING MILL.

This invention relates to an improvement in that class of grinding mills in which a cast metal, conical grinder is placed within a shell of corresponding form. The chief difficulty attending the operation of this kind of mill has been the producing of uneven work; that is to say, portions of the article being ground are discharged much coarser than others, and the mill, while working rapidly, produces inferior work. In order to obviate this difficulty, diagonal teeth or projections have been used in connection with the ordinary or grinding surfaces, said teeth or projections being designed to arrest the progress of the article being ground through the mill, and thereby insure its reduction to a proper, fine state before its discharge. This arrangement has not been generally adopted, as it creates as great a difficulty as the one it was designed to obviate, to wit, the choking or clogging of the mill. This class of mills, also, has been hitherto liable to heat, and soon becomes worn and unfit for use. This invention consists in having the rotating grinder, and also the shell, formed of a series of concentric rings, corrugated or toothed at their peripheries, each ring of the grinder, in connection with its fellow ring of the shell, constituting a distinct grinding device, the article to be ground passing consecutively through the series of grinding devices. By this arrangement, the above-named difficulties are avoided, while the advantages of this class of mills, to wit, rapidity of grinding, in connection with economy of construction, are retained. This mill is the invention of William Stewart, of Philadelphia, Pa.

MACHINE FOR SIZING SILK, &C.

This invention consists in a device for gaging or indicating the thickness of a thread of silk or other fibrous material, composed of two surfaces so arranged in relation to each other that in drawing a thread between them, its finer portions will leave one or both of them stationary, but its coarser portions will fill the space between them and so, by its friction, give motion to one or both of them. It also consists in certain mechanism operating in combination with such device for the purpose of stopping the operation of drawing the thread between its gaging surfaces as the portion of the thread passing between them increases from a smaller to a greater, or diminishes from a greater to a smaller thickness than that for which the gaging surfaces are adjusted, viz: the supposed average thickness of the whole quantity to be sorted or "sized." The credit of this invention is due to Goodrich Holland, of Willimantic, Conn.

ICE CREAM FREEZER.

This invention consists in the combination with the can, of an agitator which is so arranged that on giving motion to the beater or other device for the purpose of agitating the cream in the can, said agitator is caused to pass through the ice and salt outside the cylinder, forming and keeping up such a perfect combination, that the cream is constantly surrounded by a freezing mixture of a temperature at or below zero, for it is well known that ice alone has a temperature of 32 degrees above zero, but when made fine and thoroughly incorporated with salt, the liquefying or cooling process immediately takes place, by which the temperature is reduced 34 degrees, or to 2 degrees below zero. This degree of cold, however, can be kept up by constant stirring only, which fact accounts for the value of this agitator. E. P. Torry, of No. 9 Platt-street, this city, is the inventor of this freezer.

VAPOR BURNER.

This improved burner is intended for burning the vapor of alcohol or other volatile hydro-carbon liquid, but more especially of alcohol, for cooking or heating purposes. It consists of an inner perforated tube and an outer perforated tube, of metal, having between them an annular space filled with emery or other granulated mineral matter of sufficiently indestructible character to bear a red or nearly red heat without injury, and having a broad disk or flange at each end. The burner thus constructed is arranged in an upright position, and the alcohol or other fluid being supplied from a fountain or reservoir to the lower end of the inner tube, is evaporated, and its vapor is consumed on the surface of the outer tube and between the disks or flanges. Russell R. Lewis, of this city, is the inventor of this burner.

CAR WHEEL.

This invention relates to an improvement in what are generally termed "single plate wheels," and consists in having a continuous rib on the inner diameter of the rim of the wheel, directly opposite or in line with the flanch, said rib being used with braces to connect it with the plate. The obect of the invention is to increase the strength of the rim of the wheel, the part most requiring strength, without materially increasing its weight, and consequently without injuriously affecting the wear of the tread, the latter contingency being due to an increased weight of metal, which prevents the sudden chilling of the tread and, therefore a proper degree of hardness. George G. Lobdell, of Wilmington, Del., is the patentee of this invention.