ATTACHING HUBS TO AXLES.—Levi Adams, Amherst, Mass.—This invention relates to the manner of attaching hubs to axles. The object of this invention is to obtain a good bearing for the hub on the arm, effectually prevent the escape of lubricating material from the arm, prevent the advent of dust between the box and arm, and admit of the wheel being readily attached to and detached from its axle.

COMBINED STAMP AND CANCELING DEVICE.—Joseph H. Berret, New York city.—This invention relates to a device by which revenue stamps may be marked or printed, and canceled, at the same time. The invention consists in applying a cutting device to the ordinary hand stamp, in such a manner that, when the face of the stamp is forced down upon the revenue stamp, and the latter printed with the name of the party or firm canceling the stamp, the cutters applied to the hand stamp will perforate the revenue stamp, and effectually cancel the same.

LATHE REST.—H. K. Smith, Norwich, Conn.—This invention consists in so constructing the nut (through which the screw shaft works), for carrying the frame on which the block holding the lathe cutting is arranged, as to move the tool toward or away from the article on which it is to act, and that such nut, should the screw work loose, or play from side to side, can be tightened up therein. Also, in so hanging the block, holding the cutting or lathe tool, to a frame—arranged to be moved forward to or backward from the work on which the tool is to operate—that such block can be inclined either more or less in a direction toward the work, as may be desired,

LOADING FIRE-ARMS, AND CARTRIDGES FOR THE SAME.—S. S. Rembert, Memphis, Tenn.—This invention relates to double-barrelled breech-loading fire-arms, more particularly, and to cartridges for the same. It consists in a projection at the breech end of the barrels, between the two, of such a shape in combination with a correspondingly shaped recess or notch in the upper portion of the stock or butt, that when such projection fits in the said recess, the barrels will be held securely in position while being discharged. Also, in a novel connection between the trigger and guard, and the barrels, in combination with hinging the barrels to the butt or frame, whereby, by properly swinging such trigger guard, the barrels can be thrown up and out of place for removing or inserting a cartridge, and brought back into position, as may be desired. Also, in a cartridge case, provided with a nipple in a novel and peculiar manner, and a novel constructed nipple for the cartridge case. Also, in a simple attachment to the gun barrel for extracting the cartridge cases therefrom.

ANIMAL TETHER.—Martin Leonard and Stephen C. Leonard, Oberlin, Ohio.—This invention relates to a method of constructing tethers, whereby the same are rendered more durable and horses more effectually prevented from jumping or breaking down fences.

INNER SOLE.—R. A. Webster, Sandisfield, Mass.—This invention relates to a method of constructing inner soles for boots or shoes, whereby the same are more cheaply made and more durable, and are rendered impervious to water. It consists of one or more pieces of wood or veneers, a thin piece of wood, and a piece of felting or cloth, between which is a thin layer of gutta percha or rubber, by the warming of which all the several layers are firmly cemented together.

STEAM GENERATOR.—W. H. Thomas, Sacramento, Cal.—This invention relates to an apparatus for heating water and generating steam for various purposes.

APPARATUS FOR WORKING WINDLASSES.—Porter Evarts, Madison, Conn.—This invention has for its object to so improve the construction of the apparatus for working a ship's or other windlass, that the operator can instantaneously adjust it to obtain increased power or increased speed, as he may desire.

BURIAL CASE.—J. R. Hathaway, Westfield, N. Y.—This invention consists in forming the burial case of cast-iron plates, which are dovetailed and grooved together, the joints of which are secured and rendered air and water tight by melted lead or other equivalent metal.

FANNING MILL.—Stewart McMillan, Fletcher, Ohio.—This invention relates to an improvement in the construction and arrangement of fanning mills for cleaning small grain and seeds, and consists in building the main side frame of cross bars, making it very cheap, light, and strong, and in combining the rotary fan and the sieves in such a manner that they work with great facility by means of a crank movement connection.

PORTABLE CHAMBER CLOSET.—Wm. J. Lyman, East Hampton, Mass.—This invention relates to a new arrangement whereby most of the advantages of the real water closet are obtained, in the sick chamber as well as in chambers and dwellings generally.

CHURN.—Daniel H. Carpenter, Hector, N. Y., and Hiram L. Slaght, Lodi, N. Y.—This invention relates to the method of constructing and operating churns for dairy purposes, whereby the ordinary single or double dasher barrel churn is operated with much less labor or exertion of strength than in the ordinary manner.

FAN VENTILYTOR.—H. B. Worth, Chicago, Ill.—This invention has for its object to improve the construction of the ventilator known as Griffith's patent ventilator, so as to make it more effective and satisfactory in operation.

ANIMAL TRAP.—James A. Sinclair, Woodsfield, Ohio.—The object of this invention is to furnish an improved trap, so constructed and arranged that the rat, in seeking to reach the bait, shall cage himself, and in seeking to escape, will operate mechanism by the action of which he will be killed and thrown from the trap, leaving it set for the next rat.

MACHINE FOR MAKING PEARL BARLEY, ETC.—W. Rickard, Chicago, Ill.—This invention has for its object to furnish an improved machine for making pearl barley, pearl wheat, splitting peas, removing a part of the bran from wheat before making it into flour or farina, and other similar purposes, which will do its work quickly and well, and which will not be liable to get out of order.

SEPARATOR SIEVE.—Joseph Barker, Amboy, Ill.—This invention relates to a method of constructing the sieves of fanning mills, whereby one kind of seeds is more perfectly separated from another, and more easily free themselves from chaff and refuse. It consists of a frame covered with wire gauze on both sides, a portion of the wire gauze on one end of the frame being coarser; also, in the frame being inclined at the back end of the same, whereby the same cleans itself from chaff or refuse.

COTTON CULTIVATOR AND CHOPPER.—Zina Doolittle and A. M. Crowder, Houston Factory, Ga.—This invention relates to a device for cultivating cotton, scratching the earth from the hills of the plants, removing weeds, etc., thinning out the plants and throwing fresh earth up to the same, all being done simultaneously, or at one operation.

HARNESS.—John J. Smokey, Natchez, Miss.—This invention relates to the driving-reins of harnesses, and consists in so arranging the driving-rein as to give great leverage to the driver over the animal, and thus enable him to easily control it, without irritation, but leaving it free to use its utmost speed, and in fact to encourage it so to do, while at the same time the animal can be readily checked by the driver.

BEEHIVE.—Daniel S. Bear, Toledo, Iowa.—In this invention a beehive is constructed in two parts, and so that they may be readily separated whenever required, and the filled half of an occupied hive united to the empty half of an unoccupied hive, and colonies of bees multiplied without the natural process of swarming, and therefore without the trouble, risk, and annoyance of hiving.

GRAIN THRESHER.—A. S. Whittemore, Willimantic, Conn.—This invention relates to a method of constructing machines for the threshing of grain by hand or power, whereby the same is more effectually done without unbinding the bundles, and the straw left in better condition. It consists of a box frame through which are longitudinal parallel wires, on which the grain is placed to be threshed, and also of arms attached to an axle rotating in suitable bearings on said frame, between each pair of which are pivoted any convenient number of flails.

SILK CLEANER.—W. G. Watson, Paterson, N. J.—This invention relates to a device for cleaning silk while the same is being wound on bobbins, and consists in the use of horizontal instead of vertical guides, whereby the lateral motion of the thread as it is being wound spirally around the bobbin is accommodated.

SCROLL SAW.—B. J. Camp, Marion, Ohio.—This invention relates to a new manner of fastening, straining, and guiding reciprocating scroll saws, so that the same will work with great ease, and can be operated with the greatest speed without jarring or getting out of order.

STEAM VALVE.—Wm. Ord, Brooklyn, Ohio.—This invention relates to a method of constructing steam engine valves, whereby they operate without sticking from the unequal expansion of the parts, and are more easily adjusted, and the wear from friction more economically provided against. It consists of the combination of a valve stem with cylindrical segments, or valves, and two wedges with an intermediate key, so arranged in connection with a set screw that by forcing the key between the wedges, the segments or valves are drawn together, and the pressure against the valve casing relieved.

SHACKLE FOR THE PLATFORM SPRINGS OF WAGONS.—John Price, New York city.—This invention relates to a shackle or joint by which the ends of the several parts comprising what are generally termed platform springs are connected together. The parts of these springs are at present connected by shackles or joints which do not admit of any horizontal play of the latter and the springs are consequently subjected to considerable strain and injury, the leaves of each part being frequently disengaged from the nibs which keep them in place. This invention is designed to obviate this difficulty by constructing a more flexible joint than hitherto used.

DEVICE FOR CHANGING FEED.—R. L. Nelson, Mexico, N. Y.—This invention relates to a device for changing the feed of saw mills or other suitable machines and consists in the general combination of the devices by which the desired result is obtained, also in a new manner of arranging the gear wheels and in a new method of moving the shifting gear and of throwing in gear with the driving and driven gears.

CAR VENTILATOR.—M. T. Hitchcock, Springfield, Mass.—This invention relates to a car ventilator in which a sliding valve is employed which is moved by the wind to the rear end of its case or shell in whatever direction the car may advance.

HEAT DEFLECTOR.—Lewis Dowe and Aruna C. Colton, Sycamore, Ill.—This invention consists in arranging a series of adjustable slats within the drum or tube by which the current of heated air and gases from the fire or air chamber may be deflected and retarded in their course, and thereby compelled to part with their contained caloric.

PROTECTING HEELS OF BOOTS AND SHOES.—John Fearn, Tompkinsville, N. Y.—This invention relates to an improved mode of applying a screw to the heels of boots and shoes for the purpose of preventing them from wearing away unevenly, or more on one side than the other, and also to prevent slipping on ice where liable.

PUMP.—Taylor Chamberlin and T. Ellwood Garrett, Philadelphia, Pa.—This invention relates to a method of constructing pumps whereby they are greatly simplified in their parts and rendered more durable than those of ordinary construction, and the invention consists in a hollow shaft and piston, and in the manner in which the cylinder is constructed and the water discharged therefrom.

WELL-TUBING APPARATUS.—N. C. Clark, Low Moor, Iowa.—This invention has for its object to improve the construction of well tubing, and the manner in which it is inserted in the ground so as to make it more reliable and convenient in use.

CARRIAGE JACK.—Adam Myers, Van Wert, Ohio.—This invention has for its object to improve the construction of carriage jacks so as to make them more convenient and effective in operation.

CAR COUPLING.—John C. Heaton, Fitchburgh, Mich.—This invention has for its object to furnish a simple, strong, and reliable car coupling which shall be self-coupling, and shall have no springs to get out of order.

CORN PLANTER, SOWER, REVOLVING HARROW, AND CULTIVATOR.—W. P. Byler, Leavenworth, Kansas.—This invention has for its object to furnish an improved machine for planting and cultivating corn, harrowing ground, and sowing and putting in grain, which shall be simple in construction, effective in operation, and easily and quickly adjusted for one or the other of said uses.

SULKY PLOW.—Elias Levee.—This invention has for its object to furnish an improved sulky plow, so constructed and arranged that it may be easily raised from and lowered into the ground, which will not be raised out of the ground by the wheels passing over obstructions or rough places, and which shall be simple in construction and easily adjusted to run at any required depth.

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters must, in all cases, sign their names. We have a right to know those who seek information from us; besides, as so metimes happens, we may prefer to address the correspondent by mail.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisemets at $1 00 a line, under the head of "Business and Personal."

☞ *All reference to back numbers should be by volume and page.*

C. W. Y., of N. Y.—See reply to "G. W. E.," in No. 8, current volume, SCIENTIFIC AMERICAN, as to the estimating of horse-power of engines.

J. W. B., of N. Y.—"What are the lightest liquids known and the process of manufacture? Can water be made lighter by chemical means, and if so by what process?" The light products of petroleum are the lightest liquids known. They are separated from the heavier portions by distillation. Water can be made lighter in the same way—that is by boiling. It then becomes steam which is the vapor of water, commonly called, but not properly, water. The addition of any chemicals could only increase its weight.

J. B. R., of N. Y.—"Will you, or some of your readers inform me the method of clearing cinder from the fire brick of a hard coal stove? How can I loosen the tops of lamps fastened with plaster of Paris?" Oyster shells burned in the stove fire, or chalk, or limestone will assist in detaching clinker. We know of no solvent for dried plaster of Paris. Kerosene or benzine will sometimes soften it sufficiently to facilitate its removal.

W. J. H., of Mo.—"If the air be extracted from a case or box and an inclined plane four feet in length, having a grade of one inch to the foot, be constructed within the box, will a ball run down the incline with greater velocity than if the box contained air?" A ball will roll or fall faster in a vacuum, as air offers a resistance.

E. K. P., of N. Y.—"Is there any form of glass prism that will decompose a ray of light into a perfect circle or rainbow of the seven colors instead of the ordinary oblong spectrum?" Yes, let the prism be bent or curved. For a perfect circle use convex lens.

J. B. S., of Wis., asks for the philosophy of the common observation that "it is too cold to snow." We all know that the weather moderates on the fall of snow, and that our coldest days succeed the fall. It is a natural law that bodies in passing from the liquid to the solid state always give out an amount of latent heat. Now snow is frozen vapor, and in its change in the air from the liquid to the solid form, heat is imparted to the atmosphere and its temperature is increased. Similarly, when the snow begins to melt, it draws from the air its latent heat necessary in order to turn from the solid to the liquid state.

J. A., of Me.—The origin of amber is assigned to a resin which flowed from the trunk of certain trees which flourished in the tertiary period. We would refer you to an article on amber and meerschaum published on page 161, Vol. XV.

G. J. L., of Conn.—Bituminous and anthracite coal differ in that the former contains a large amount of pitchy volatile substances which readily ignites and burn with smoke and flame. In the latter these substances by some means have been driven out, and the remainder being a purer variety of carbon burns without smoke or flame.

A. A. L., of Ind., calls attention to a prevalent notion among millers that a water wheel under the same head runs with a greater velocity in the night than in the daytime. "If any explanation is attempted by the workmen, they assert that the air becomes heavier after sunset." We have before us the observations on this very subject made by Prof Cleveland and published in the *Journal of Science*. He selected one fine day in August, and at two o'clock, P. M., the barometer standing at 30·19 inches, the number of revolutions of the wheel was ninety-six in a minute. At midnight the pressure of the atmosphere had increased seven-hundredths of an inch the temperature of the water being the same, the wheel was found to revolve precisely ninety-six times in a minute, showing the same velocity as on the preceding noon. The workmen admitted the truth of the result but seemed to believe that it would have been different on a cloudy night. This matter has been fully discussed in previous volumes of this paper.

Business and Personal.

The charge for insertion under this head is one dollar a line.

EXTENSION NOTICES.

Frederick G. Schaum, administrator of Frederick Schaum, deceased, of Baltimore, Md., having petitioned for the extension of a patent granted to him the 25th day of April, 1854, for an improvement in glass furnaces, for seven years from the expiration of said patent, which takes place on the 25th day of April, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 13th day of April next.

William Baker, of Attica, N. Y., having petitioned for the extension of a patent granted to him the 16th day of May, 1854, and reissued the 22d day of September, 1863, for an improvement in clap board joints, for seven years from the expiration of said patent, which takes place on the 16th day of May, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 27th day of April next.

Albert Fink, of Louisville, Ky., having petitioned for the extension of a patent granted to him the 9th day of May, 1854, for an improvement in bridges, for seven years from the expiration of said patent, which takes place on the 9th day of May, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 27th day of April next.

Wm. H. Mitchel, of New York city, having petitioned for the extension of a patent granted to him the 16th day of May, 1854, for an improvement in machinery for composing type, for seven years from the expiration of said patent, which takes place on the 16th day of May, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 27th day of April next.

Edward Brown, of Waterbury, Conn., having petitioned for the extension of a patent granted to him the 16th day of May, 1854, for an improvement in machines for making hinges, for seven years from the expiration of said patent, which takes place on the 16th day of May, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 27th day of April next.

Ward Eaton, of New York city, having petitioned for the extension of a patent granted to him the 16th day of May, 1854, for an improvement in machines for cutting glaziers' points, for seven years from the expiration of said patent, which takes place on the 16th day of May, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 27th day of April next.

B. J. La Mothe, of New York city, having petitioned for the extension of a patent granted to him the 4th day of April, 1854, for an improvement in railroad cars, for seven years from the expiration of said patent, which takes place on the 4th day of April, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 16th day of March next.

Benj. A. Lavender, of Halifax, N. C., and Kate Lowe, administratrix of the estate of Henry Lowe, deceased, of Baltimore, Md., having petitioned for the extension of a patent granted to the said Benj. A. Lavender and Henry Lowe the 4th day of April, 1854, for an improvement in treating cane fiber for paper and other purposes, for seven years from the expiration of said patent, which takes place on the 4th day of April, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 16th day of March next.

Warren Gale, of Peekskill, N. Y., having petitioned for the extension of a patent granted to him the 12th day of Sepember, 1854, for an improvement in straw cutters, for seven years from the expiraton of said patent, which takes place on the 12th day of September, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 2d day of June next.

Elias Ingraham, of Bristol, Conn., having petitioned for the extension of a patent granted to him the 3d day of December, 1861, for an improvement in design for a clock case, for seven years from the expiration of said patent which takes place 3d day of December, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 26th day of October next.

NEW PUBLICATIONS.

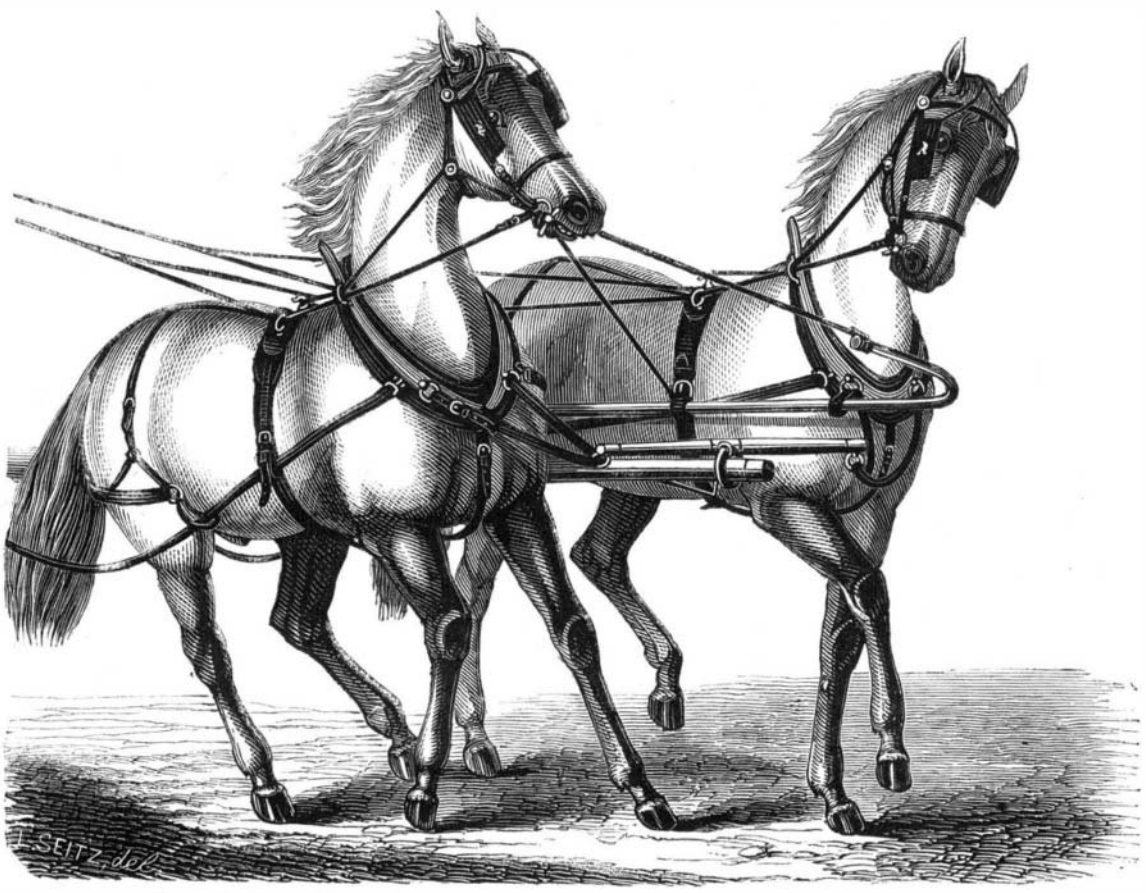
Method for the Cure of Balky Horses.

In the ordinary harness where two horses are connected as a span, or side by side, it is well known that the horse inclined to balk, as horses are ordinarily harnessed, has really an advantage over the willing horse. He can refuse to draw and not only keeps his breeching tight by his weight, but compels his willing mate to pull the load and himself too. In many cases the balky horse is not maliciously inclined, but is discouraged, and needs only an evidence of sympathy or an exhibition of kindness, or perhaps is ignorant and requires instruction. All of these requisites for the correction of obstinate horses or the education of unlearned animals appear to be furnished by the device shown in the engraving accompanying this article.

It is simply a rod or pole of wood curved at the front end and secured to that side of the harness of the true horse next to the balky horse. The rod is fastened to the thill strap, side buckle, and hames of the true horse in such a manner that the curved end shall project in front of the head of the balky horse. A stout strap with snap hook or buckle at one end is passed through the first bit ring of the balky horse, under his jaw through the opposite bit ring, then back and fastened to the first bit ring, thus securing the horse's under jaw. The slack of the strap is then fastened securely to the curved end of the rod leaving a length of from nine to fifteen inches, more or less, from the bit to end of the stick. A common hitching strap is now tied to the bit of the balky horse and to the side buckle of the true horse, leaving a foot or more play to the former to prevent his plunging too far forward when the attachment is ready. The action of the fast and loose bit and strap on the under jaw of the balky horse soon reduces him to the condition necessary for driving him.

When the attachment is to be used for a single horse it is made longer and lighter than when for two horses, and is flattened to fit snugly the upper side of the right shaft of the buggy, with two staples attached to the rod, one near the back end and one just forward of the usual hold-back iron on the under side of the shaft. Corresponding staples are affixed to the under side of the shaft and by these and straps the rod is firmly secured to the shaft bringing the curved end to a point about one foot before the horse's head. In this end is set a little pulley and a line from the horse's bridle, attached as in the two-horse plan, passes through the instrument and around the pulley, back through the rings or terrets, thence to the buggy, where it is so attached to the dasher, or forward piece below the dasher, that by means of a little lever with a pulley in it, one third the distance from the bottom end of the lever, it shall shorten the rein double the distance the lever is drawn at that point.

Patented through the Scientific American Patent Agency January 14, 1868, by W. W. Beebee, whom address for further information at Dubuque, Iowa.



BEEBEE'S PATENT FOR CURING BALKINESS IN HORSES AND MULES.

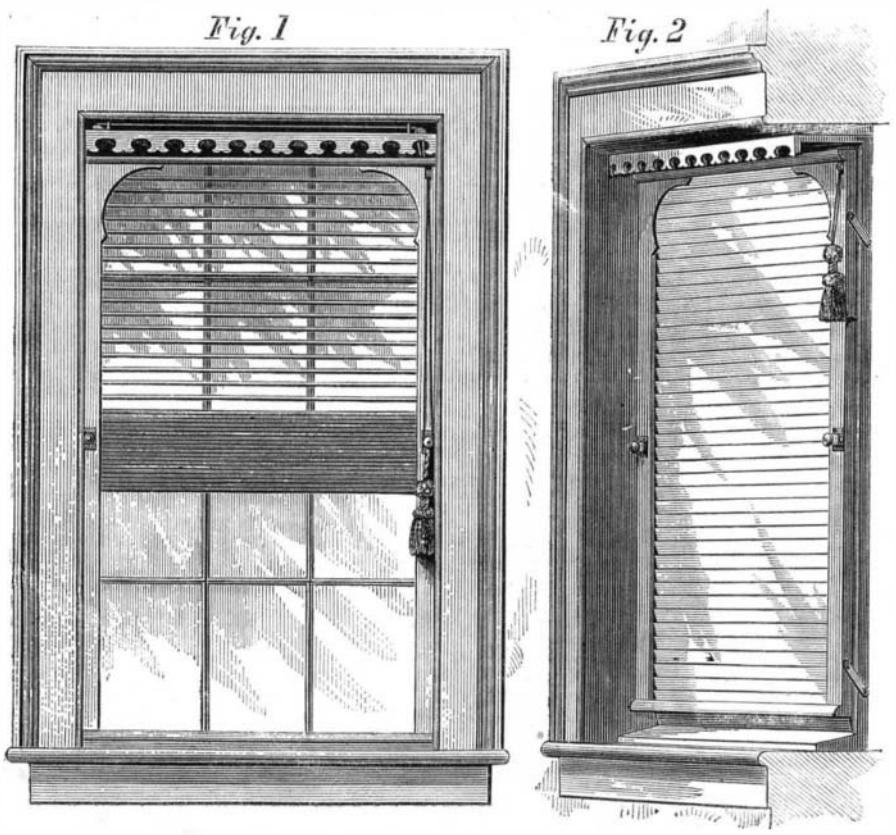
Improved Window Blinds and Shades.

The Venitian blind has been so extensively adopted in this country that it might almost claim to be American. Whether used on the inside or outside of the window, in combination with shades or curtains, it fulfills the object of precluding the sun's rays and at the same time admitting the air. It is not, however, always convenient to swing an outside blind from the interior, and an inside one as usually constructed is cumbersome.

The object of this invention is to simplify the blind or to combine it and the shade in one device. It can be applied to cars and steamboats as well as houses, and being entirely on the inside can be readily operated. The frame containing the device is of two parts, a fixed and a movable one, seated in the window casing, the uprights of both parts being recessed or grooved to receive the webbing which connects the slats and by which they are suspended. Their ends are connected to the webbing by cords or wires passing through holes in the edges of the slats and through the webbing. A lifting cord runs through central holes in the ends of the slats. one end being fastened under the lower slat and the other passing over rollers at the top of the frame. For convenience the two lines, one at each end, are combined and connected to a tassel at one side, the combined cords passing over a grooved truck seated in the top of one side of the movable frame, as seen in Fig. 1, where the passage of the lines over the top of the frame and their connection with the tassel are plainly shown

Fig. 1 is the blind partially raised as a shade, and Fig. 2 the blind entirely closed. This closing is effected, when the blind is down, by a lifting up of the inner or movable frame, which is hinged by pivoted bars, seen in Fig. 2, to the stationary frame. Small spring catches on the sides of the movable frame may be made to lock into suitable recesses in the window casing to retain it in place at any hight desired.

It is evident that this blind may be adjusted readily to any required position, opened, closed, or held partially closed. It will suit any form or size of window, and does not interfere with the use of draped curtains. It was patented through the Scientific American Patent Agency Dec. 17, 1867, by S. W. Shorey, who will reply to all communications in reference to territorial rights, etc, if addressed at Galesburg, Ill.



SHOREY'S PATENT INSIDE WINDOW BLINDS.

Preparation of Potash Dyes.

"I take yellow prussiate of potash, or the first crystallization. and dissolve in hot water and make the solution to 20 deg. by Baumé's hydrometer, then pass a stream of chlorine gas through the solution, but not more to be introduced than will prevent precipitation, as may be tested by persulphate of iron, when it is ready to be barreled for shipment or use. In this mode of preparation a larger amount of chlorine is retained which, in the preparation of red prussiate of potash, is dissipated in the process of evaporation and exposure. This loss is by the present new process avoided and by that means a great reduction in labor and cost is effected, and a superior article produced being in value, as yellow prussiate of potash, a saving of nearly seventy-five per cent, in red prussiate of potash, fifty per cent. One hundred pounds of yellow prussiate of potash, or first crystillization, make four hundred pounds of the improved solution." Patented by John Reynolds, San Francisco, Cal.

Manufacturing Steel by the Use of Oxidizing Salts.

The latest of the many improvements in the steel manufacture consequent upon the discovery of the Bessemer process, is the following invention of Mr. James Hargreaves, which we find described and commented upon in the columns of *The Engineer:*

"Several attempts have been made to use nitrates in converting iron into steel by placing the substances below the level of the bath of molten metal, and thereby causing the oxygen of the other gases evolved by the decomposition under heat to pass up through the metal. Experience, however, showed that the reactions took place so rapidly and with such force as to throw about the metal. But Mr. Hargreaves has fully comprehended the necessity for finding a remedy for the too rapid decomposition of the salts. The salt taken by Mr. Hargreveas is the nitrate of soda, on account of its cheapness and high percentage or oxygen. The most important function of the nitrate of soda would not, however, so much consist in its decarbonizing powers, as in its being an agent 'in removing the metalloids, silicum, sulphur and phosphorous, and the semi-metal arsenic, by forming with them compounds of sodium:' the materials are placed below the fused cast iron, and the products of the decomposition rise up through the fused metal. By taking the nitrate of soda, the quantity of carbon to be removed can be regulated at will by the quantity of nitrate used, and the alkaline residue would 'give rise to the formation of silicate of soda, sulphide of sodium, and phosphide of sodium.'

The first experiments were instituted at the Widnes Foundery. On finding that the oxygen from the nitrate of soda and the chlorates of potash and soda are evolved so rapidly that it was dangerous at once to pour the molten iron upon them, the use of clay as a diluent, and a retarder of the action of the chemicals occurred to Mr. Hargreaves. Its successful action in this way, in its turn suggested the substitution for it of hematite ore. A cheap oxide of iron would thus, while diluting the action of that other chemical, offer an additional supply of oxygen and an increased yield of metal. The nitrate of soda is therefore mixed with a portion of hematite in order to retard its action, and the slightly moist paste thus composed is pressed into the bottom of a vessel lined with fire brick. This paste is then dried into a solid block, either by means of the heat left in the vessel after the last operation, or specially produced. When dry, the molten iron is poured into the vessel, and the layers of the composition scraped up. The high ferrostatic pressure soon carries portions into the mass of molten metal, and the reactions take place between them. The molten metal appears to boil, and a frothy slag, said to contain 'the impurities extracted from the iron,' rises to the top in company with some oxide of iron and compounds of soda. The metal can then be tapped out. In order to be enabled to apply the process of the puddling furnace, and thus employ established plant, he got over the difficulty of the bottom of the puddling furnace being too hot, and hence at once uselessly decomposing the salt, by making the converting materials into hard dry blocks. Several such blocks are successively pushed to the bottom of the molten metal in furnace, the products, of course, rising up as in the fixed vessel. By this means it is said that the puddling operation is shortened, with an attending saving of labor and fuel: and, above all, that the yield is better, from 'the soda forming a base which readily combines with the silicic and phosphoric acids eliminated from the iron.' Mr. Hargreaves states that he can make refined iron for puddling by the use of about three per cent of nitrate and six per cent of peroxide of iron; steel, by eight to ten per cent of nitrate and an equal weight of binoxide of manganese; and malleable iron by eight per cent of nitrate and twenty per cent of peroxide of iron, in each case iron with five per cent of carbon being used. The bulk of the slag produced is materially increased by the presence of the silicate of soda.

Neglect of belts, in oiling, "taking up," and their general management, is a prolific source of expense in manufactories and shops. The eye of the manager should often be directed to the belts, their running, condition, etc. It will save time, expense, and trouble.