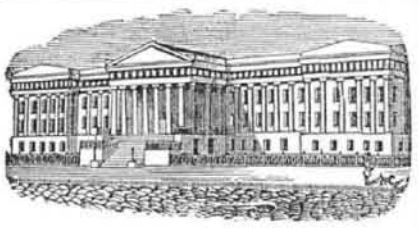

[Reported Officially for the Scientific American.]

LIST OF PATENT CLAIMS

Issued from the United States Patent Office

FOR THE WEEK ENDING JUNE 6, 1854.

KNITTING MACHINES—B. S. Wood. of Burrillville, R. I.: I claim. first, the employment of a series of wide and narrow tongued jacks, arranged in any desired order of succession, to form short loops upon the frame needles, and lay long loops between certain of the said needles, so that they may be entered and caught by a set of rib needles working parallel or nearly so, with the frame needles, as described.

Second, the method of giving a lead or advanced motion to the narrow jacks, by means of the double slur, having one part wider than the other, and the recess, made in the heads of the wide jacks, to prevent their being operated upon until the wide part of the slur comes in contact with them, and allow only the narrow jacks to be operated upon by the narrow part, as set forth.

Third, I claim the movements of the two sets of needles relatively to each other, as described, that is to say, the front needles, rising first, and then remaining stationary to receive the loops upon and between them, the rib needles being in the meantime stationary, but rising after the loops are formed, and entering the loops intended for them, and then both sets of needles descending together to carry the loops through those previously formed.

Fourth, arranging the rib needles at such a distance from the front needles that their upward motion will not carry them through the loops and springing their ends forward to the requisite position for this purpose by means of a pressor, constructed, arranged, and operated as set forth.

Fifth, attaching the head which carries the jacks, the slur, and the thread carrier, to a frame which is capable of swinging back, as described, to expose the needles and afford greater facility for their adjustment, for the running on of the quarter, and for the repair of any damage to the machine or to the web.

[This is an excellent invention. A description of it may be found in No. 27, present Vol. Sci. Am.]

BALANCING SLIDE VALVES OF ENGINES—Robt. Waddle, of England. Patented in England, April 27, 1853. I claim first, the equilibrium table with its ledges or their equivalents, applied to and acting in combination with the valve, as described.

Second, I claim the packing pieces extending from the back of the valve chests and abutting against the back of the valve, in combination with the small passages leading to the ports, as described.

Third, I claim combining the equilibrium. table or its equivalent, with the packing and small passages by the joint action of which a slide valve is perfectly and entirely balanced.

MACHINES FOR WASHING BOTTLES—A. H. Rauch, of Bethlehem, Pa.: I do not claim a folding brush for washing bottles independent of its peculiar construction.

But I claim a rectangular shaped folding brush which has three of its sides made of solid strips and set with bristles, which serve to clease the shoulder, periphery, and bottom of the bottle at the same operation, while its other side is made hollow and serves as a canal for introducing a constant stream of clean water to the interior of the bottle. to facilitate the cleansing operation, and the whole united together by loose joints, in such a manner that when the brush is folded, the cross-piece which carries the brush for cleansing the bottom of the bottle, will assume a position in line and parallel with the hollow stem while the pieces carrying the side and shoulder brushes assume a vertical position in line with each other, and lie parallel alongside the stem and bottom brush, as set forth.

I do not claim washing bottles in an inverted position, but I claim the employment of the revolving cone, or its equivalent, which is so arranged and operated that it takes hold on the inverted bottle, having its mouth resting in a socket, and causes it to revolve rapidly when the machine is in operation, and brings its inner and outer surface in contact with the inside and outside cleansing brushes, as described.

Third, I claim the employment of the stationary inside and outside cleansing brushes, in combination with the revolving cone and inside and outside branch pipes of the elevated reservoir, the whole being for the purpose described.

Fourth, I also claim the self-adjusting arrangement for accomplishing the three following objects: 1st. Folding the expanding frame, and retaining it thus ready for entering the mouth of the bottle. 2nd. For elevating the revolving cone so that it may be out of the way when the bottle is being placed over the brush; and, 3rd. For shutting off the supply of water while putting another bottle to be washed over the expanding brush.

Fifth, I claim arranging a spring between the supply stem and the side strip of the brush frame, for the purpose of expanding the brush as it enters the body of the bottle, as set forth.

[This novel invention is illustrated on page 281, Vol. 8, Sci. Am.]

INSTRUMENTS FOR TAKING DEEP SEA SOUNDINGS—C. F. Brown, of Warren, R. I.: I claim an implement constructed and operated as described, for sounding the depth of the ocean.

[This application for a patent was made in the month of June, 1853, and the correspondence which has passed between the Patent Office and the Attorneys of the inventor, during the past year, would fill a medium-sized pamphlet, and we believe would interest and amuse the Inventors of our country more than any publication which has been issued for a long time. In a word, "much ado about nothing" has been made over this case, while substantially the same claim is granted that was at first submitted for examination.]

BRICK POTTERY KILNS—Joseph Baron de Palm, now in New York City. Patented in England, July 13, 1852; in France, Aug. 13, 1852; in Holland and Belgium, Sept. 15, 1852: I do not claim secondary or vapor chambers over the main chambers, forming an upper tier with numerous apertures through which heat passes from below.

But I claim a series of upper and lower chambers in kilns for baking or burning bricks and pottery, communicating with each other by apertures in the partition walls and floors, in combination with adjustable dampers or registers in the apertures in the floors between the upper and lower chambers, as described, for regulating and controlling the heat in its ascent, and directing it to those parts of the upper chambers, where it may be most required, as specified.

COMBINATION OF RAILROAD TRACKS AND WHEELS—H. R. Campbell, of Lebanon, N. H.: I do not claim the compound rail (or a rail composed of two or more bars in its cross section) so joined and fitted together as to form one continuous rail on each side of the track to be used, with wheels of a single tread and a flange on one edge.

Nor do I claim a rail with a groove in it, or two rails so arranged as to form a groove between them, to be used merely as a guide to the flange of common wheels.

Nor do I claim a wheel with a flange in its center of tread which is intended to run and bind in a groove or double rail, or a grooved wheel intended to bind upon a single rail, to create an unusual grip or friction over that due to weight on rails of inclined planes.

The essential and distinguishing character of my improvement is the double rail in combination and use, with wheels having a tread or bearing on each side of the flange, as described.

I claim the combination of the wheel with the flange in the middle of the tread (which shall be symmetrical on both sides of the flange, as to diameter and tread) with the double line of rails, so constructed that the flange of the wheel shall run freely between said double line of rails, and with sufficient play or space between said double line of rails to avoid unnecessary friction against said flange, and to accommodate the ordinary inequalities in the width and parallelism of the railroad track; the surfaces of said double line of rails to be level or nearly so, and the two portions of the tread of the wheel to bear the whole weight of the wheel equally or nearly so, on the surfaces of said double rails.

The track and wheels to be arranged for use in combination and for application to railroad purposes, as shown.

IMPRESSING THE THREAD UPON SCREW BLANKS—Samuel McCormick, of Dublin, Ireland. Patented in England March 22, 1853: I claim forming or impressing screw thread or ornaments on the plain surface of screw blanks or other plain shafts of metal, by means of three revolving dies placed triangularly on a suitable frame and worked by mechanism described.

BERTH KNEE FORMER—Donald Taylor, of East Boston, Mass.: I claim the combination and arrangement of the side rollers or bars, A E, the slotted bars, C D, and the bar, I, with the springs, friction rollers, G H, and set screws, or their equivalents, whereby a person is enabled to adapt the instrument, or berth knee former, between any two timbers, and to the width for the berth knees, as set forth.

MACHINE FOR DRESSING POLYGONAL TIMBER—Henry Allen, of Norwich Conn.: I do not claim the employment of a pattern rail to guide a rotary cutting tool or wheel over a piece of work, such have been used in turning irregular forms.

Nor do I claim the invention of a tracer permanently fixed to the frame.

But I claim the means whereby the said cutting tool may be adapted to the reduction of a stick of any ordinary diameter and to a size suitable to the stick, as described, such improvement consisting in combining with the tool frame, the sliding rest operated by the lever, and held in position by it and the perforated size plate, as specified.

BENT TIMBER FOR SHIP FRAMES—Wm. Ballard, of New York City: I claim cutting the heart out of artificially bent ship timbers at the curve or bend known as the "naval timber," and combining therewith an iron plate (curved so as to fit the curve of the timber) by inserting it in the place cut out of the timber, so as to be protected from rusting by the action of the atmosphere or bilge water of the ship, as described.

CULTIVATORS—Whitman Price, of Goldsborough, N. C. I claim the construction of the accommodating frames having uprights and cross ties or suspension bars, together with the compensating strap, or equivalent.

I also claim the construction of the twisted obliquely curved blades or thinners attached to the radial arms forming a rotary cotton thinner, and using the same with the right and left double shank furrow shears, as set forth, and arranged with the cultivator.

MAKING SEAMLESS METAL TUBES—Jared Pratt, of Taunton, Mass.: I claim extending and finishing seamless metal tubes, by moving the mandrel and tube in a horizontal direction, while the rollers or their equivalent dies surrounding the tube are rotated, or moving the dies in a horizontal direction, and rotating the mandrel and tube, as set forth.

DAMPERS IN ROTARY STOVES—Wm. W. Hill, of Greenport, N. Y.: I claim the combination and arrangement of the dampers with a revolving or rolling oven, as set forth.

GRAIN MILLS—Walter Westrup, of Wapping, Eng. Patented in England, Jan. 24, 1850: I claim the general arrangement and combination of parts described, that is, the use of two or more pairs of mill stones, the runner of each pair being mounted on the same vertical shaft, and arranged in such a manner that when the meal escapes from the first pair of stones, it may be subjected to a dressing operation for the purpose of separating the already formed flour from the unground meal, as set forth, leaving the unground meal when freed from the flour to pass through the second pair of stones to perfect the grinding operation.

RIVET CLAMP FOR WIRE FENCES—M. P. Coons, of Brooklyn, N. Y.; I claim the peculiarly constructed rivet clamp and its application to wire fences, or equivalent purposes, as described.

MOTH KILLER—W. A. Flanders. of Sharon, Vt.: I do not claim to have invented a blow pipe in which the flame of a lamp is urged by a stream of alcoholic vapor generated by the heat of the lamp itself.

But I claim the moth killer, constructed and operating as set forth, the lamp being entirely protected from the wind, and from being extinguished by the dead millers, and the flame blown through an opening in the side of the lantern.

MACHINE FOR CLEANING AND WATERING STREETS—Ross Deegan, of New York City: I do not claim the rotary brush or the apron, as such have been used before in machines of this character; neither do I claim of itself the revolving fan or blower.

But I claim the method of removing dust from streets by a rotary sweeper beneath the machine, combined with a fan revolving at high speed, in an external chamber, which is connected by passages with the chambers which first receive the dust, and the chamber of deposit, as specified, by which arrangement the dust is driven within the action of the fan by the sweeper, and by suction drawn to the fan chamber, whence it is driven to the chamber, D. and there deposited, the air in passing out under strong pressure through the finer reticulations in the cover of said chamber.

FLOURING MILLS—Edwin Clark, and James M. Clark, of Lancaster, Pa.: We claim, first, the double conveyer for the fine flour and middlings, constructed as described, to wit, the conveyer for the middlings being attached to a tube enclosing the conveyer for the fine which terminates in the receptacles, R, and that for the middlings in another receptacle: and in combination with this double conveyer, we claim the arrangement of the receptacles, elevators, and spouts, for returning the fine flour and middlings, respectively to the bolt, and the eye of the mill, as set forth.

Lastly, we claim the arrangement in series of spouts with their slide valves in combination with the separate receptacles and conveyers.

TURNING HUBS—Smith Beers, of Naugatuck, Conn.: I claim the arrangement and the manner of operating a series of revolving cutters, for the purpose and in the manner set forth.

[See notice of this improvement in No. 15, Vol. 9, Sci. Am.]

DEVICE FOR OPERATING CUTTER HEADS OF PLANING MACHINES—T. F. Tait. of Worcester, Mass.: I claim hanging the planing cutters to the vibrating arm, or its equivalent, as set forth.

VAULT COVERS—Alfred Brady. of New York City: I claim the cylindrical lens having its upper face formed as set forth. in combination with the india rubber or other elastic water-proof packing and vault cover, whether made of wood or metal, as described.

HYDRANT CAP—N. W. Speers, of Cincinnati, O.: I claim the formation of the cap or cover of a stop cock box with catch of a width exceeding the play of the cap within the rebate, and with pivots whose distance from their confining flanges exceeds the depth of the rebate, or equivalent devices, for the objects described.

MECHANISM FOR OPERATING PUMPS—James A. Whipple, of Boston, Mass.: I claim the combination of the wheel, the cogged segments, and the racks upon the end of the pistons, by which I attain an accelerated motion of the pistons at the same time that the power which actuates them is applied in a vertical line passing through their center.

ROAD SCRAPERS—S. H. Dudley, of Milton: Conn.: I do not claim the invention of scrapers, chains, and hooks; but I claim the combination of the bow or bows, with the scraper, for the purpose set forth.

MACHINES TO PRINT NAMES, &C., ON NEWSPAPERS—E. P. Day, of New York City: I claim the type cylinder having a series of type grooves cut in its periphery and parallel to its axis, and binding screws in the cap or end plate of the cylinder for adjusting the type in the cylinder grooves, in combination with the table platen and ratchet wheeel, for holding the paper and printing and rotating the cylinder. as an improvement on Henry Moser's, invention for like purposes, and whereby all the names of a subscription list for one post office, and the address of the post office, may be printed at one operation.

WHIFFLE TREES—F. M. English, of Hopkinsville, Ky.: I claim the described arrangement of springs on the ends of swingle-trees for holding the traces on the darts and throwing off the same at the will of the driver, as set forth.

LUBRICATOR—R. M. Wade. of Wadesville, Va.: I claim the hollow cylinder, in combination with the jacket, as set forth, namely the two apertures in the cylinder being so situated, that while the upper one is admitting oil into the cylinder, the lower one is closed to the steam—and when the lower aperture is open to the steam the upper one is closed to the steam and to oil in the cup.

STEAM GENERATORS—A. B. Latta. of Cincinnati, Ohio: I claim the dividing of the coil or coils commencing with one, then dividing into two, and then subdividing into four or any other number, as described.

SOFA BEDSTEADS—C. F. Martine, of Boston, Mass.: I claim the windlass barrel and its working gears or their mechanical equivalents, and the cords of said windlass barrel in combination with the seat, the back, and a single spring mattrass, as applied thereto, the whole, being applied together and made to operate as specified.

EYELET MACHINE—H. L. Lipman, of Philadelphia, Pa: I lay no claim to the devices described, separate and uncombined; but I claim the arrangement in one stock of the double-acting lever, punch, and fastener, with their spiral springs, and counter dies, or anvil block, for the purpose of punching holes for and setting eyelets in one machine, as set forth. and this I claim when said lever actuates both punch and fastener, by allowing one to rise while the other is being forced down, as shown.

EXCAVATOR—Elijah Phelps, of Hendersonville, Ill.: I do not claim scoops, supported by side wheels; but I claim the combination of the wheeled scoop with the castor wheels, operating as and for the purposes set forth.

SEED PLANTERS—Wm. B. Johnson, of Staunton, Va.: I do not claim said groove semi-cones, or their equivalents, separately and apart from the other devices, used in combination therewith by me, as their equivalents have been used by F. Vandoven, and are described in the specification of his seed planter, patented April 13, 1852.

I claim the method described of sowing seed broadcast, by means of the ascending and descending buckets, grooved semi-cones, or their equivalents, and reciprocating bed or table, constructed, arranged, and operating together, as specified.

I also claim constructing the seed buckets with an open back and false or close adjustable linner back, for regulating the lifting capacity of the buckets, as set forth.

WATER LEVEL INDICATOR FOR STEAM BOILERS—Patrick Clark, of Rahway, N. J.: I claim the arrangement of the tube in relation to the chamber in connection with the boiler, whereby through the action of the steam and water in the chamber upon the steam in the tube, the water in the tube is made an indicator of the hight of the water in the boiler, or made to operate a valve in the feed water pipe, as described.

FEATHERING PADDLE WHEELS—Thos. Champion and S. Champion, of Washington, D. C.: We claim, first, the bowing or arching of one or more of the shanks of the paddles, so that they may pass through the hub and stand in the same transverse line with each other round the wheel, with the paddles on each end of each shank permanently at right angles to each other.

Second, we claim giving to the shifting guides a side motion just sufficient to disengage them from the projections of the paddles from one side of the hub, and simultaneously engage them with projections on the other side of the hub, and vice versa, so as to effect the proper adjustment or shifting of the paddles, and whereby we dispense with the inconvenience of having to turn the frame around to the opposite side of the wheel to shift the guides.

SEED PLANTERS—Whitman Davis, near Morgantown, Va.: I claim operating the seeding bar of seeding machines by means of a bell crank and lever, when said lever receives its motion from the leg of the operator in the act of walking, as set forth.

APPARATUS FOR FILING SAWS—John Sheffield, of Pultneyville, N. Y.: I claim the arrangement of the stirrups, cords, weight, and rollers, for holding, guiding, and supporting a file whilst filing a saw in the gate or frame, as set forth.

GOLD AMALGAMATORS—Robt. H. Collyer, of New York City: I claim effecting the amalgamation of the gold, or other metal, and the separation of the ores, or other foreign matter, by means of a cylinder or cylinders, fluted to form buckets, or otherwise provided with such buckets, and revolving within a concave trough, or concave troughs, which contain the necessary quantity of mercury, said cylinders operating as described.

[This invention is noticed in No. 32, this Vol. Sci. Am. and is a counterpart of the Amalgamator illustrated in No. 15, where this part of the invention is shown combined with Dr. Collyer's original patent.]

LATH MACHINE—Isaac R. Shank, of Buffalo, Va.: I claim the revolving gauge formed of two unequal cylindrical segments in connection, as described, with a reciprocating knife. for the purpose of gauging and insuring the liberation and discharge of the lath.

OPERATING SAW MILL BLOCKS—David Russell, of Drewersburgh, Ind.: I claim the combination of the transverse racks, the wheels, and the shafts, with the horizontal connecting piece and its racks, as set forth.

LATHE—H. O. Clark, of Worcester, Mass.; I do not claim the sliding rest or the V-shaped knife, or the side cutters simply, or the bushings, except when used in combination, as described.

I claim the knife in combination with the slide operating in a straight line to and from the center, or nearly so.

Second, I also claim the movable bushings applied to all the different sized cylinders required.

WEAVING CUT-PILE FABRICS—Thos. Crossley, of Boston, Mass.: I claim the described method of weaving a cut pile fabric, that is, interweaving the pile into the body of the cloth, by looping it over a shot of filling on the top of the foundation warp, and under a shot of filing under the foundation warp, as described.

CLEANING BOLTS OF FLOURING MILLS—Wm. Cann, of Black Rock, N. Y.: I claim the application to flouring bolts of a brush or cleaner as described, which will prevent the bolts of flouring mills from becoming clogged up with and obstructed by "beards," and other substances which are contained in almost all wheat, and which will keep the bolts clean and free without the necessity of "shaving" and "brushing" the bolts, using for that purpose the aforesaid cotton, woolen, or other cloth or flexible material which will produce the desired effect.

GRINDING MILLS—Edward Harrison, of New Haven. Conn.: I am aware that a disk faced running millstone has been supplied with a metallic back and eye. when the said runner has been suspended upon a bail and the grain fed through the eye of the same. And I am also aware that a small sized running mill stone without a metallic back and eye. has been rigidly secured to its spindles: I do not claim either of the said arrangements.

But I claim the grinding mill produced by forming the runner of a metallic back and hub combined with a disk grinding face, composed of the requisite quantity and quality of stone, and rigidly securing the shaft within the metallic hub of the runner, when the said runner is arranged and operated with the stationary uppermost stone, as set forth.

SECURING CAR WHEELS UPON AXLES—Jordan L. Mott, of New York City: I claim the method described of securing railroad car wheels to their axles by means of a nut, or its equivalent, within the wheel, as set forth.

JOINT BODIED BUGGIES—E. J. Green, of Cedarville, N. Y.: I do not claim a joint bodied buggy with a spring under the seat, as that has been described in the patent of James C. Spencer, of the 27th May, 1851. Nor do I claim the invention of a spring reach, which shall allow the separation of the front and rear axles to a certain extent, and then act as a tie to prevent their further separation, as the patent of C. H. Guard, of June 10 1851, embraces a spring reach which performs this office.

Nor do I claim a spring reach with one point of connection on the center of the front axle, and two points of connection equi distant from the center on the rear axle, as this is embraced in the patent of Starr Fairchild, of the 18th January, 1848.

But I claim the combination of a spring reach of the peculiar form and construction, as described, with a joint-bodied buggy of the form and style of that patented by J. C. Spencer, by means of which greater strength is given to the buggy and an easy and elastic seat given to the driver with less expense and greater simplicity than has been hitherto used for like purposes.

HAY PRESSES—Levi Dederick, of Albany, N. Y.: I claim traversing the follower parallel by two set of levers or toggle joints with one lever of each set extending beyond the joint of connection, so as to form a lever to operate the joints; when they are so arranged that the lever of the lower set or joint may work or vibrate between the fulcrum levers of the upper one: the two levers being connected together by a rod or links. the whole being constructed and operated, as described.

MOLDING HOLLOW WARE—J. J. Johnston, of Alleghany, and J. V. Cunningham, of Pittsburg, Pa.: We claim the arrangement of the follow board, core box, and anchor, operated as set forth.

GRINDING MILLS—J. C. Reed (assignor to C. P. Buckingham & H P. Upton,) of Mount Vernon, O.: I claim, first, the hollow spindle in combination with the metallic cup, through which the grain to be ground is fed, as specified.

Second, the method of balancing and adjusting the bed stone by means of adjustable weights, arranged in radial guides and movable towards and from the center of the stone, as described.

DRYING FLOUR—Hervey Ely (assignor to S. P. Ely,) of Rochester, N. Y.: I claim closing the cylinders or other conveyers at each end; or causing them to revolve in close boxes, as described, for the purpose set forth.

Second, applying to the exterior surface of closed cylinders, continued currents of heated air, so regulated as to keep the contents of the cylinders at a given temperature, by an arrangement of dampers, and the observation of the thermometer attached, as set forth.

BLOWING FAN—Thos. Wallace. and Elizabeth Bacmeister (admx. of Henry Bacmeister, dec.), of Philadelphia, Pa.: We do not claim any improvement in the outside casing of a fan, nor in the means and apparatus by which rotary motion is produced.

But we claim the cylindrical revolving diaphragm, with one or more openings for the escape of the air by the combined action of the centrifugal force and a vacuum, as set forth.

COOKING RANGE—Dennis Donovan (for himself and as administrator M. G. Hallman, dec., assignor to Henry J. White,) of Philadelphia, Pa.: We claim the hinged flue cover, consisting of the hinged cover, side pieces, flue spaces, and top flue, in combination with the valves or dampers.

Also, in combination with the hinged cover and the valves, the arrangement of the aperture for the escape of fumes from cooking.

Lastly, we claim the sliding boiler plates in combination with the hinged cover and valves or dampers.

CAR AND OTHER WHEEL TIRES—Alfred Krupp, of Essen, Prussia: I am aware that tires have been made without welding from a disk expanded from a center opening.

I claim making the tires for railway car and other wheels out of solid bars of cast-steel, without welding, slotted, opened, expanded, and finished into the desired shape, as described.

[The Examiners have worked well the past week, and if they will contiue as industrious through all the summer months, they will have cleared off the old cases to such an extent, by next fall, as to merit—and they will receive them too—the commendations of the whole army of inventors in the United States.

It cannot be that our proposition to take a branch of the Patent Office in New York to manage (vide No. 38 Sci. Am.) has prompted this accelerated action on the part of the Office. Has it? If it has our object is accomplished: and now if they will continue as active, we will permit the Office to remain consolidated without further advocating the opening a branch in this city.

Balloon Ascension.

John Wise, the veteran aeronaut, made his 163rd ascent from the Crystal Palace yard, in this city, on Friday, the 9th inst., at 3 P. M. The day was squally, making the voyage of the bold balloonist dangerous, but with his usual intrepidity and skill he made it successfully, although he lost his balloon. He descended below Flushing, L. I, and jumped down 40 feet to save his life.

Singular Cause of Death.

Miss Elizabeth A. Sawyer died at Valatie, N. Y., last week, from the effects of poison, communicated to her system by some yarn, which she placed in her mouth, and which came in contact with a sore.—[Ex.

[Some colors are dyed with arsenic. Thus the beautiful light sea green on cotton is died with arsenic, sulphate of copper, and caustic alkali. The yarn of this color is poisonous.

Assam Tea.

Some years since an English company undertook the culture of tea in the country of Assam, situated between Bengal and China, on the waters of the Burrampooter. The London papers state that this company has now under cultivation 2,115 "poorahs" of land. Their last crop of tea amounted to 366,587 pounds, or an increase of about 95,000 pounds over that of the previous year.

Willow Dock.

They are building a willow dock at La Crosse, Michigan. It is constructed entirely of willow twigs, about twelve feet long, bound in bundles one foot thick, which are so ingeniously arranged and woven together that it is impossible for the sand to work out or the water to work in. Each bundle contains about one hundred small trees, and it will take fifty thousand of these bundles to complete the work.