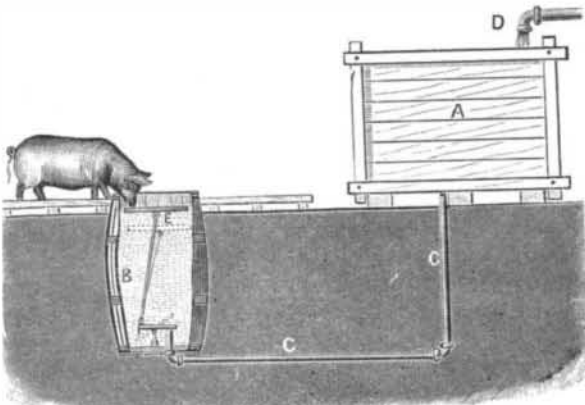


NOVEL DEVICE FOR WATERING ANIMALS.

The device shown in the annexed cut furnishes a constant supply of clean water and prevents waste, and is therefore well adapted for watering animals, and especially hogs. A barrel, B, is sunk into the ground, and is connected with a tank, A, or a pond or water main, by a subterranean pipe, C, which projects a few inches into the bottom of the barrel. A pivoted gate or valve rests upon the end of this pipe, and the other end of the valve is connected with a float, E, which is so arranged that when the barrel is filled the end of the pipe, C, is closed by the action of the float; but as the animal begins to drink the level of the water in the bar-



DEVICE FOR WATERING ANIMALS.

rel decreases, the float, E, falls with the water, and opens the valve at the end of the pipe, C, admitting fresh water from the tank until the barrel is again filled.

STEAM TUGBOAT EXPLOSION.

BY S. N. HARTWELL.

The sketches which I herewith submit are intended to illustrate the accident, if a blow-out may be so designated, that happened to the boiler of the steam tug Jacob Brandow, in the lower bay of New York, on the 2d of June. The perspective sketch (Fig. 1) represents the boiler lying on its side, which position has no reference to the effect of the blow-out, but it is so placed for the purpose of showing the location of the rupture and its relation to adjacent parts of the boiler. It will be seen that the boiler is of the double furnace tugboat type, a variation of the fire-box form common in the towing practice of this city and vicinity. Its principal dimensions are: Diameter, 7 feet; length, 15 feet; dome, 4 feet diameter by 5 feet high. Two furnaces, each 34½ by 72 inches horizontal measurement; height above grates, about 30 inches. There are 10 flues, 5 to each furnace, through which the gases pass directly forward to the smoke connection, whence they return by 75 tubes to the up-take (or front connection) and chimney. The flues first mentioned are to each furnace: one 12 inches, three 8 inches, and one 7 inches diameter. The boiler was made of five-sixteenth iron plates, by a reputable city manufacturer, in 1867, since when, about seventeen months ago, it was fitted with new furnace sides and put in thorough repair. The workmanship and material appear to be the best. No stamp indicating the tensile quality of the iron was observed, however, upon the plates. The steam pressure allowed by the government certificate is 65 pounds by the gauge; and there was one common lever safety valve, by which steam was supposed to escape when the limit of pressure was reached.

About 6:30 P. M. on the 2d of June, while steaming at the usual working pressure—something less than 65 lb.—a piece of one of the new sides blew out, apparently starting at the point a Figs. 1 and 2, where the iron is now but about half its original thickness, namely 0.155 (originally 0.312). The sketch, Fig. 2, gives an idea of its proportion and present shape. At other points, as b and c, the thickness is respectively 0.185 and 0.165 inch. On the side, e, at the margin of the piece, is observed the peculiar defect called *star corrosion*, indicated by radiating lines at the stay holes. This condition is often found on the water side of stayed flat surfaces that have been subjected to a sufficient pressure to puff the plates between the stays, giving it the appearance (in less degree) of a mattress. This has the effect of opening the texture of the plate around the stay hole, which goes and comes as the pressure falls and rises; radial lines of corrosion are formed, deepening and widening toward the hole with each successive motion, till leaks and finally ruptures occur. When there is a considerable area of overloaded plate stayed insufficiently, one stay head pulls through, and the rest, being overpowered by a sudden accession of load, give way successively, and a sufficient body of water escapes, the reaction and expansion of which produces the phenomenon known as an explosion. In this case, however, the *star corrosion* may be considered as an indication rather than a cause of the weakness, for appear-

ances indicate that the initial rupture was along the other margin of this piece, along the lap of the seam where a continuous groove had resulted from corrosion on the fire side of the plate, and having progressed faster, probably from unobserved leaks, gave way first. The sketch, Fig. 3, shows the construction of the parts on a larger scale. The leak that caused the corrosion of the fire side of the plate was probably only a sweating leak, which is the most dangerous because it is most likely to escape observation. If this had been a case of a dripping leak probably the surface below the seam would have suffered most, and perhaps have given way instead of that above the seam.

The effect of this blow-out was an opening of about half a square foot of area, through which the water was forced with terrific power, beginning at a theoretical velocity of about 100 feet per second and ending at something like half that, supposing that none of the free steam escaped from the steam room through the intervening water. Sixty cubic feet of water would thus escape in about two or three seconds, allowing for obstructions in the furnace, and everything movable would be driven before it, as was the case. The engineer, who was supposed to be in the fire room, made his way to the deck probably nearly dead, and was lost overboard. The fireman, his son, who was on the top of the boiler, in the act of shutting off the steam jet, was badly injured. The fire upon the starboard grates and coals in the fire room were blown against the woodwork abaft the engine and against the engine itself with a force sufficient to abrade the whitewash and paint with which these parts were ornamented. Government certificates and officers' licenses, that were duly posted according to law, were sadly defaced, but no serious damage was done to the boat, as would most likely have happened if the weak area had been of sufficient extent to have allowed of the instantaneous escape of the boiler contents.

The government certificate of inspection, which is the form approved February 11, 1880, expires on the 30th of July, 1881, indicating that about ten months had elapsed since the boiler was inspected. It shows, also, that the hull was built of wood in 1864, and that the boiler, rebuilt in 1880, was built in 1867, as stated above. Other memoranda in the certificate, are: one safety valve, one steam gauge, one low water gauge, one fusible plug, and three gauge cocks. The certificate was signed by Austin Joyce, Inspector of Hulls, and John K. Mathews, Inspector of Boilers.

Mr. William Tebo, the polite owner of the Brandow and a number of tugs beside her, offered every facility to the writer for obtaining the sketches and other memoranda embodied in this report, and being himself a practical engineer, indicated, by his personal attentions and sentiments expressed, a desire to inform his fellow engineers, through the press, just how it happened. A thorough reinspection is to take place in a few days, when he will promptly and cheerfully do to the boat just what the government inspectors direct.

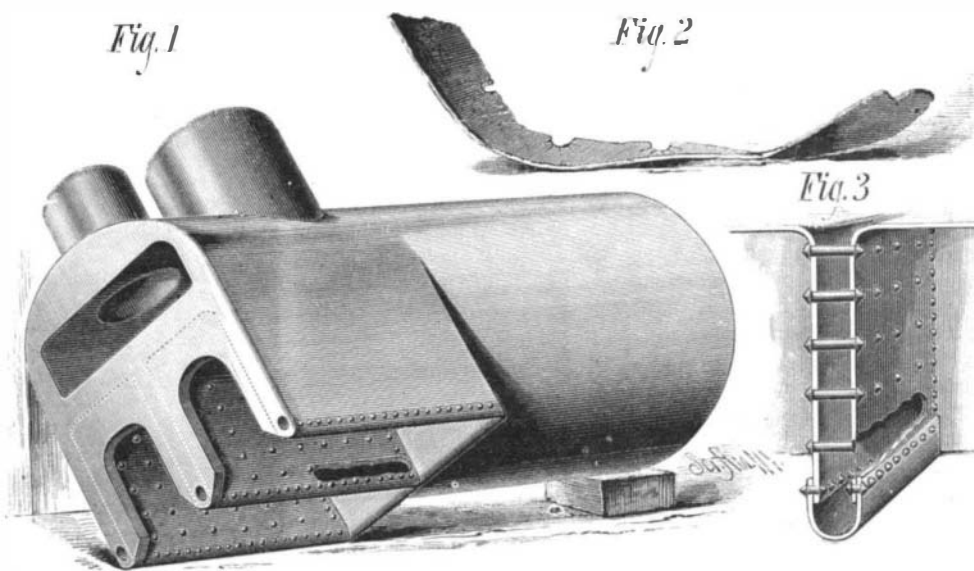
The American Institute's Semi-Centennial.

This year's fair of the American Institute, of the City of New York, will be the fiftieth of these useful exhibitions. The desire of the directors is to celebrate the occasion by an exceptionally full presentation of novel inventions, machin-

Fig. 1

Fig. 2

Fig. 3



BOILER EXPLOSION.

ery, and industrial products. Their announcement of the "Semi-Centennial," on another page, we commend to the attention and co-operation of our inventors and manufacturers.

Telegraph Cables in Sewers.

An important experiment looking to the disuse of telegraph poles in cities is being made in Washington, D. C., by the Mutual Union Telegraph Company. Having received permission to run their wires through the common sewers of the city the company began the work of placing the wires June 6. The wires which are needed for the city service and for connection with lines outside the city are twisted cable form and covered with a non-conductor and waterproof coating. Outside the city limits these wires

emerge from the sewers and join those placed upon poles. The cable made of the twisted wires is attached firmly to the arched roof or top of the sewer, and thus raised above all interference from water, except in case of floods. The cables are laid by men enveloped in rubber clothing and provided with safety lanterns, provision being made for conducting fresh air to the workmen by means of India-rubber tubes attached to their rubber suits. The wires are passed down through the man holes of the sewers.

VELOCIPED CARRIAGE.

The engraving shows a light and compact velocipede car-



VELOCIPED CARRIAGE.

riage of German invention, calculated for easy and comfortable riding and capable of carrying light baggage. The rider sits in an easy chair above the forward axle, and grasps the guiding handles attached to this axle. The feet rest upon pedals connected by rods with cranks on the rear axle. By the alternate movement of the pedals the carriage is propelled. A lantern is carried in front, and a canopy covers the head of the rider.

NEW INVENTIONS.

Mr. George W. Mason, of Sharon, Pa., has patented a composition of matter to be used for making artificial stone, and consisting of pitch made from gas-tar, cement, plaster of Paris, lime, ground cinders, ground ore, ground oyster shells, fine ashes, pulverized dry clay, dry sawdust, ground slate, ground stone, sand and pebbles, and molten brimstone.

An improved harvester guard finger has been patented by Mr. Elisha S. Snyder, of Snyder's Mills, West Va. The invention consists in a sectional guard finger constructed with two reversible plates, each having two cutting edges, the plates being arranged to engage with the sickle knives, and held in position by a removable top section provided with beveled edges, which may be utilized by inserting a sickle having inverted knives.

Mr. Charles A. Pennington, of Champaign, Ill., has patented an improvement in field corn huskers which consists in the peculiar construction of the revolving husking rolls, between which the cornstalks are forced and the ears husked, and in a revolving recessed wheel for feeding the stalks carrying the ears between the husking rolls. The machine is provided with a fender and guard for the stalks, for the purpose of holding and guiding them while the corn is being husked.

Mr. James H. Palm, of Lexington, O., has patented an improved device for raising and lowering the front end of a clevis pivoted to the forward end of a plow beam, whereby the plow can be made to plow deeper or shallower; it consists of a clevis having its opposite arms pivoted to a plow beam on each side near its forward end, and provided with a cross rod, to which a slotted tongue carrying a pin is hinged, the pin on the tongue engaging in a cam groove in a wheel provided with a crank shaft extending back parallel with the beam.

An improvement in shovel plow blades has been patented by Mr. Henry A. Ridley, of Newport, Ark. The object of this invention is to facilitate the enlargement and contraction of shovel-plow blades, as the character of the work to be done may require, and also to facilitate repairing the blades.

Mr. Jacob G. Walton, of Davilla, Texas, has patented an improved cotton planter having a vibrating agitator which is used in combination with a hopper.

THE tower clock of the First Presbyterian Church, Newark, N. J., lately stopped. The town time-keeper found in the wheels of the clock a tangled mass of hay, twine, grass, cotton, and feathers, amounting to nearly half a peck. A pair of birds had entered the tower through a hole in the dial and attempted to build a nest in the machinery of the clock. The slow revolution of the wheels tore their work to pieces, and they kept on reconstructing it until they stopped the wheels.

Rubber Nipples.

To enumerate different kinds of rubber nipples alone would be a weariness. Scores of kinds there are of all shapes, sizes, and colors, good, bad, and indifferent, and still new devices are daily added and the demand increases. Nipple making is among the most interesting of rubber specialties. When made by hand the operatives are always girls, as the work, though light and pleasant, need dexterous, rapid fingers.

The first step in the preparation of a first-class hand-made nipple is the material. It is commonly mixed sheet, either white, black, or maroon. "Lead gums" are but seldom used for black, because of their alleged poisonous qualities. The fine tracery of parallel lines that cover the surface of certain kinds of nipples, imparting a flesh-like grain, is called the "print," and is given to the mixed sheet before it is cut into nipple pieces.

A simple and inexpensive manner of producing this print is to have a metal plate upon the surface of which parallel grooves are marked. These grooves are clear cut and even, with no breaks, and of the same depth. From this rubber impression plates may be made, by placing a sheet of vulcanized rubber upon the metal plate, rubber side down, and curing in a steam press. The result will be a plate as good as the original, and capable of more wear and tear. Indeed, this new plate is, for practical use, far superior to the metal, for where the latter would unavoidably receive dents and abrasions which would soon obliterate the print, and in addition to this, would be so heavy as to be cumbersome in the extreme, the former may be hammered and knocked in all possible ways and yet show no abrasion, and, better still, is so light that it can be handled with the greatest ease.

After a sufficient number of impression plates have been prepared the mixed sheet for the nipples is cut into lengths that shall fit between the plates; each plate is wiped lightly with a brush dipped in talc, and a sheet of rubber is placed upon it. These sheets and impression plates are then placed in a compact pile and submitted to gentle pressure. In due time the unvulcanized mixed sheet takes from the impression plate the print, and after it is fully set it is ready to be cut into nipple pieces. When taken away from the pressure, the plates and mixed sheets seem to be one compact mass. They can, however, be separated if not left too long.

The condition of the print, although primarily depending upon the condition of the impression plate, may be materially injured by careless "stripping."

The printed sheets, after being stripped, if they have been stretched, are plunged into hot water, or otherwise heated, in order to shrink them, and then given to the nipple cutters. Several sheets may be cut at once, if brushed lightly with talc. The die should be very sharp, as otherwise the edge of the nipple piece will be rounded, and consequently harder to knit in the making.

The nipple pieces when cut are: for small nipples, nearly heart-shaped; for large, cone-shaped. In the former the seam extends from the bottom up one side and just over the crown, the other side being seamless; while in the latter the seam completely divides the nipple. Small nipples are therefore made in one piece, large nipples in two pieces. To cut large nipples two sheets are laid together with the print inside. The natural stickiness of the stock will hold these pieces together, which helps materially in the making up.

After the nipple pieces have been delivered to the makers, the next process is cementing. The pieces are neatly laid in piles, and then, by means of a small brush, painted with a cement made of mixed sheet dissolved in naphtha. They are then spread upon tin plates to dry. To facilitate the drying process, each nipple table has attached to it a small steam oven, so arranged that it may heat a number of tins, and yet cause little annoyance by its proximity to the makers.

The kit of tools for a nipple maker consists of a small slanting "case," in which are places for a certain number of nipple formers, two cement cups with brushes and "steep tops," a small glass "naphtha well" set in the case, similar to an ink well, a naphtha brush, thumb cots for taking off nipples after being vulcanized—tin plates for drying—pans for packing, cleaning sponge, and set of nipple formers.

The small nipple formers are pear-shaped pieces of metal set upon iron pins. The large formers are simply hollow cones of metal or glass. The case has holes for small and "rests" for large formers. The rows are so arranged that their nearness to one another does not interfere with the most rapid work. By the side of each case is a rest for the tin, which is provided with a small adjustable clamp to hold it in position. Beneath this case are skeleton drawers, on which are set pans of talc for packing the nipples when finished.

After the nipple pieces, placed in the oven to dry, have become thoroughly warmed, and the solvent has so evaporated as to make the cement just right to knit well, the maker takes a former, dips it in the talc, places it in the center of a piece, draws the edges together, and, with a rapid pressing of the thumb nail against the two edges, closes effectually and neatly the gaping seam. The former with its half-made nipple is then returned to its place, and another former covered. In the same way the whole case is studded with pear-shaped rubber covered formers.

Next in order is the making of the flange at the lower end. For this purpose the cement brush is again brought into requisition, and the lower end cemented. When dry, the operator, with the right thumb, presses firmly on the lower edge with an upward motion. This turns it over a

little, and, when continued around the stem, makes a small ring at the lower end of the nipple. A continuation of this brings out the flange. Large nipples are cemented, seamed, and flanged, and then turned inside out, as they were cut with the print within.

When finished, the nipples, formers, and all are packed in shallow pans half filled with talc. The packing in itself is quite an art, as there must be economy of space, and as a quick thrust must be given to each one, in order to force a little talc between the stems of the former and the nipple, to prevent the flange from adhering to the stem. When packed they are taken away to the heater, where, after being filled full of talc, the pan is loaded upon a car and run into the heater. The "chalk room," in which the nipple pans are filled, is provided with tables, under which are large bins. Below the level of the table tops are a set of sieves, and into these the pans of vulcanized nipples and talc are poured and sifted, each worker keeping her "heats" separate.

Taking the nipples off from the former is oftentimes very hard work. Especially is this true of small nipples. Then it is that the "cots" come in place and save many tender fingers from blistering. But after the knack of slipping them off has been learned, it is wonderfully easier. A short season of scouring in the cylinders is next in order, after which the nipples go to the potash boiler.

The punching of the holes in the crown of the nipple is done by hand. Small punchers are set in standards at each table. The nipple is placed upon the punch and hit firmly with a small wooden mallet. The rapidity with which many of the makers punch the nipples is surprising. For a finishing touch the girls take them again in hand, pack them in paper boxes, and the nipple is ready for market.

A curious part of the process of nipple making is the care the girls take of their finger nails. These before all other tools are a necessity. If brittle the utmost care in trimming is taken, and they are washed, scrubbed, and oiled with daily solicitude. A cracked nail is a calamity, as no seaming at all can be done until it is grown to the proper length.

Black nipples, after being washed frequently, have a grayish dirty tinge, which is removed by dipping them in a liquid black.

Nipples, instead of being always made by hand, as in the foregoing, are frequently "dipped;" that is, the former is plunged into a cement made of rubber dissolved in some solvent, and then dried. This being repeated until a suitable coating is obtained, when the flange is rolled as in other nipples. They are also made in moulds. Finger cots and other rubber articles of similar shape are cut, cemented, and made over formers in the same manner as nipples.—*Rubber Era.*

MISCELLANEOUS INVENTIONS.

Mr. William Slow, of New York city, has patented an improved strainer for the outlets of tubs and basins which can be removed from the washer of the outlet of a tank, tub, or basin, for the purpose of clearing it in case it becomes clogged. The invention consists in the combination with a washer having an internally-threaded neck, of a strainer having an externally threaded vertical flange capable of receiving a plug. It is readily removed by means of a small key or wrench furnished with it, when it can be cleaned and the waste pipe can be readily cleaned when the strainer is removed. The strainer may consist of an apertured plate, or of netting, or of two bars, as may be desired.

An improved tracheotomy has been patented by Mr. Lewis J. Lyman, of Manhattan, Kan. The improvement relates to surgical instruments for use in opening the trachea in cases of membranous croup, or in any case when it is necessary to practice tracheotomy. The object of this invention is to provide for more easily effecting an entrance to the trachea than can be done by instruments heretofore in use, and for retaining the instrument in proper place after insertion. The invention consists in a blade of peculiar shape upon a spring arm fitted between two spring-holding arms that are formed with T-ends, and also in a catch for simultaneously securing and loosening the spring-arms.

Mr. Charles W. Posten, of Boone, Iowa, has patented an improved washing machine, which consists of a circular vessel formed of two cones united at their bases, and is provided with a shaft attached to the apex of each cone, and resting on suitable bearings in the sides of a tub or tank adapted to receive it. The double conical vessel has numerous perforations and indentations all over its surface.

An amusing toy bank for children has been patented by Mr. John Murray, of New York city. The invention consists in the combination, with the head that forms the body of the bank, of the tongue and the inclined and weighted pivoted bar carrying the tongue, whereby the weight of a penny placed upon the tongue will turn the pivoted bar and cause the tongue to pass into the head and drop the penny into the interior of the head.

An improved sash holder, patented by Mr. John H. Lynch, of Lowell, Mass., consists in a roller wheel pivoted in journals sliding horizontally in the lugs of a plate attached to the outer surface of one of the side rails of a sash, which wheel is pressed against the pulley stile of the window frame by a spring, and is provided on one of its sides with a ring of ratchet teeth, which engage with like teeth of a peripherally ratcheted wheel loosely mounted on the shaft of the rubber wheel, which ratchet wheel is acted upon by a spring pawl, that permits both the ratchet wheel and rubber wheel to

rotate when the sash is being raised, but locks the ratchet wheel and the rubber wheel as soon as the sash is released, and thus holds it in place; but if force is exerted the rubber wheel is disengaged from the ratchet wheel and the rubber wheel can rotate, thus permitting the sash to descend.

An improved device for drying fruit and vegetables and evaporating liquids has been patented by Mr. John A. Warner, of Furnaceville, N. Y. The invention consists of two upright fixed cylinders placed concentrically one within the other, the outer cylinder having rollers fixed on its inner face in such a position as to form a disconnected spiral track for the outer ends of the evaporating trays, and the inner cylinder being provided around its outer face with a continuous spiral for the inner ends of the evaporating trays.

An improved draught equalizer has been patented by Mr. Albion Wheeler, of Ridgeway, Iowa. The invention consists of a novel arrangement of levers in combination with the tongue and stay or bed-rest of the machine.

An improvement in magnets for separating iron chips patented by Mr. George E. Bowers, of Fitchburg, Mass., consists of a magnet having a straight core and helices wound in opposite directions inclosed in a tube or hollow cylinder that is attached to one pole of the magnet, and also provided with a switch, whereby the direction of the current around a portion of the magnet can be reversed, so as to demagnetize the core and cylinder and thereby release the chips.

An improvement in storing compressed air or other gas in vessels has been patented by Mr. Alexander James, of Edinburgh, Scotland. The invention relates more particularly to a method and means for storing compressed air for motive power for locomotives or cars for railroads. The invention consists in a method of compressing air wherein the adhesive attraction of an absorbent material or materials is made to assist in reducing the volumes of gaseous bodies in confined spaces or inclosures.

Mr. Jabez Smith, of Sabula, Iowa, has patented a sling for throwing missiles, such as stones, bullets, etc., by hand, with considerable force. It consists in a band of rubber or other elastic material having a pocket to receive the missile in the middle, the ends of this elastic band or equivalent being attached to the ends of the prongs of a fork provided with a suitable handle.

An improved stove leg has been patented by Mr. William R. Fenerty, of Louisville, Ky. This invention consists in casting the lower edge of the stove with a downwardly-inclined flange having undercut projections on the inside thereof, in combination with the leg cast with a surrounding shoulder to support the weight of the stove, and with an upwardly inclined shank the side ends of which are beveled to correspond with the undercut projections, forming a dovetail therewith, the leg being also provided with a central stud for locking the leg to the flange of the stove.

An improved life-preserver has been patented by Mr. John Thompson, of Victoria, British Columbia, Canada. The invention consists of a series of floats so hinged to a belt that is to be fastened around the body that when not in use the floats hang perpendicularly from the belt, and when the device is in use the floats extend radially and at right angles from the belt and lock themselves in position.

An improved method of improving the appearance of furs, patented by Mr. Lucinius Havasy, of New York city, consists in attaching the tips or outer ends of feathers to the fur in such a manner that these feather tips will appear between the hairs of the fur, and will produce various effects, according to the position in which the fur is held.

Agricultural Notes.**LAWN GRASS.**

The very best grass I have made use of for a lawn is unquestionably orchard grass. But then to make it effectual for this purpose no half-way measures should be practiced in preparing the ground, sowing the seed, and cutting the grass. The soil should be rich, in fine tilth, and free from weeds. The best preparation of it is to cultivate it in potatoes or some other hoed crop the preceding year. If this can be taken off in August, early or late, according to climate, the seed may be safely sown in that month, if not, leave it till the following spring, and then put it in as early as possible. Plow, harrow very fine, and level the ground. Then sow at least at the rate of four bushels per acre, so that the ground can be thickly stocked. If this is not done the grass forms tussocks, and these spoil the beauty of the lawn. Never sow clover or any other seed with this for a lawn, but one may do so with clover only for a field crop if desired, as both are ready at the same time to cut for hay, which, to have it tender and succulent, should be in the earliest of blossoming. After sowing brush the surface nicely and then roll. Cut the grass as often as it gets about four inches high. This keeps it from growing coarse, and makes a closer, firmer sod. This grass is the first to shoot up in the spring, and the last to turn brown in late autumn or during the winter. Ray grass, if treated in the above manner, comes next to orchard grass in making a superior lawn.—*Correspondence Country Gentleman.*

SOWIN SEEDS.

In sowing grass and vegetable seeds remember Mr. Peter Henderson's caution about "firming the ground" By pressing the roots about the soil they germinate quicker and the young roots more readily take a firm hold upon the soil. The neglect of this process may cause the loss of the crop if the season should prove dry.