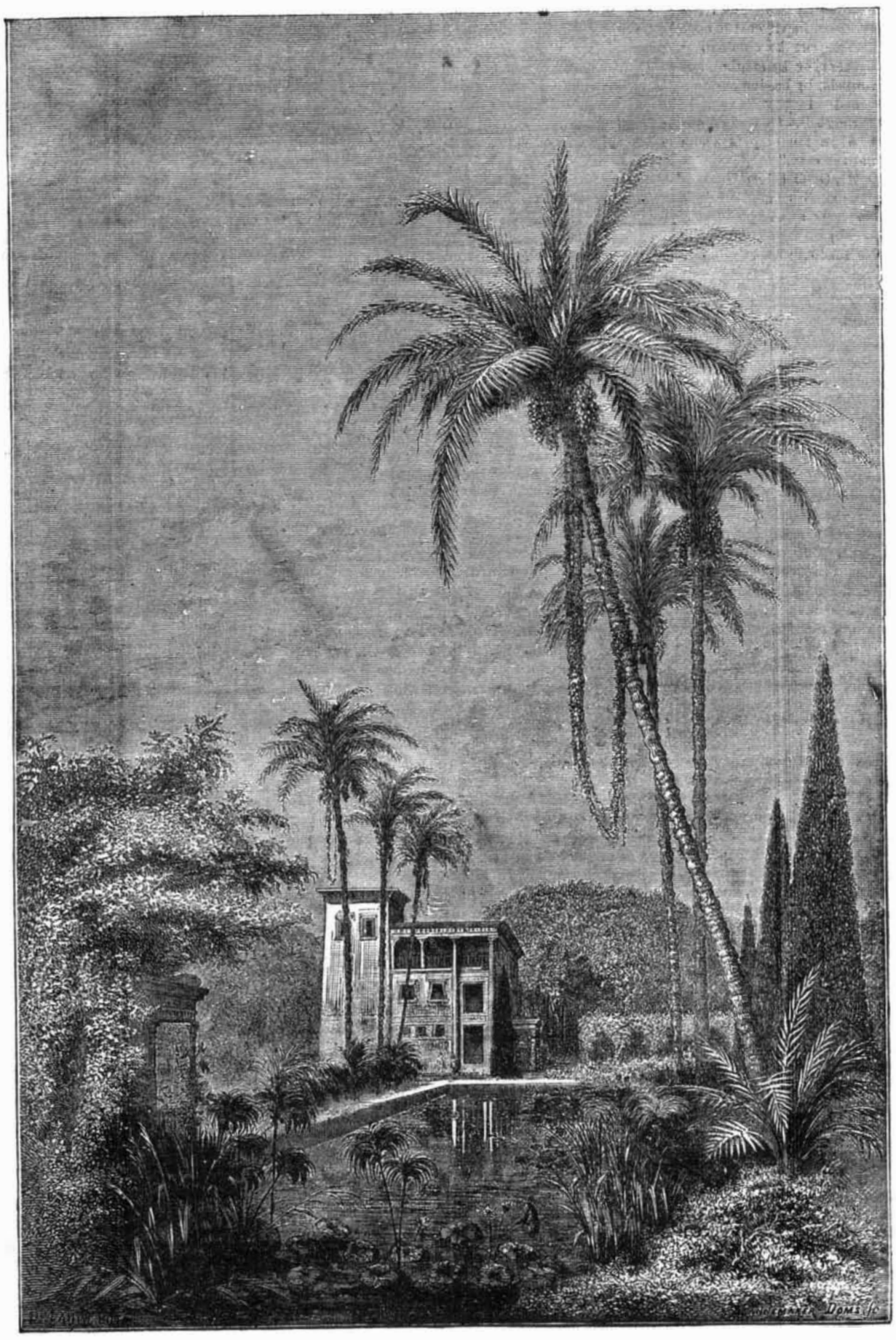
MODERN EGYPTIAN GARDENS.

Only those who have visited Egypt during the winter months can form any idea of the calm repose that almost invariably pervades that wonderful country at that period of the year. The clear blue sky and quiescent atmosphere cause such a dreaminess to overspread, as it were, the whole country, that, except near the cities, one may easily imagine one's self in a land of spectre palaces, villas, and mosques. The graceful heads of the date palm, poised calm and motionless in the air, relieve the towers of the country mansions of much of their monotony. It is winter, yet the orange trees are laden with golden fruit, the jessamine, rose, and geranium are still in bloom. The leaves of the vine and other deciduous trees have just begun to turn red and brown, and to prepare to fall.

Our illustration, for which we are indebted to *The Garden*, is a good representation of a modern Egyptian villa and garden of the Mameluke period. The square basin and stately cypress, the vine-embowered path, producing shade and grapes in abundance, and the little summer house or kiosque in which the owner and his family enjoy the grateful weed and aromatic coffee, are faithful delineations of Egyptian garden life. During the past thirteen years, gardening has made rapid progress in Egypt, the frequent visits of the Pashas, princes, and Khedive to Europe having given the Egyptians of high rank quite a taste for European horticulture; and gardeners from England, France, and Italy have been employed in various localities, but more especially in the neighborhood of Cairo and Alexandria, to carry it out.

The Gezira garden is the best imitation of an English establishment in Egypt, and it has been created at an enormous expense. Embankments, artificial mounds, rock work, and water are all very naturally introduced; good breadths of lawn, dotted with trees, shrubs, and parterres of flowers, produce, in this land of sunshine, a more pleasing effect than in our own country, on account of the scarcity of grass in Egypt. To achieve this desideratum, large tanks or reservoirs have been constructed of sufficient hight to serve the fountains and to force water to every part of the garden, which, during summer, has to be kept in a state of perpetual irrigation. In the Gezira garden is a magnificent collection of tropical trees—palms of many kinds, ficus, cathartocarpus, musas, cycads, acacias and others too numerous to mention. Among the vast variety of climbing plants in this garden, the most notable is *bougainvillea spectabilis*, which grows with all the wild luxuriance of a wistara in our own country, and is annually covered with thousands of spikes of its lovely mauve colored bracts. In few countries is vegetation more rapid or luxuriant than in Egypt, if the irrigation is attended to; consequently it takes but a few years to have a perfect garden.



A MODERN EGYPTIAN VILLA AND GARDEN.

THE BOW AND STERN SCREW PROPELLER.

Mr. Robert Griffiths, of London, the well known screw propeller man, has lately made a discovery in the propulsion of vessels which, he thinks, is likely to effect a revolution in the economy of steam navigation. His plan is to inclose the propeller in tunnels, and to place one tunnel propeller in the bow and one in the stern. From practical trials made with small models, he concludes and asserts that he obtains an improvement equal to nearly 50 per cent in the speed of the vessel, without increasing the power. At a recent meeting of the Royal United Service Institution, Mr. Griffiths gave an interesting account of the progress of screw navigation, from which we select the following:

"It is generally admitted that barely 50 per cent of the power exerted by the engines is made available to propel the ship, by either screw, paddle wheels, or any other plan of propulsion which has yet been practically used, the other 50 per cent being lost in some way, to account for which there are a variety of opinions.

"I have for several years given up the idea that any further improvements were to be realized by any further change in the configuration of the screw propeller, and consequently turned my attention to the mode of applying it; my first patent in this direction, obtained in 1871, was for applying a screw at the bow of the ship within a tunnel in combination with the screw at the stern in the ordinary way; I afterwards found very great advantages in having both the bow and stern screws in tunnels, for which I obtained a patent in 1872. I was much surprised to find when I doubled the power by applying one portion to the bow screw and the other to the stern screw, each within a tunnel, the speed of the model increased nearly as the square root of the power, but if I doubled the power on either the bow or stern screws separately, the speed of the model in that case increased only as the cube root of the power. It is well known that the resistance to bodies propelled through the water varies as the square of the speed, while the power required is as the cube. At last it occurred to me that this great advantage must be due to the increased quantity of water that was passed through the screws within the tunnels, when both were at work, over what was due in the same time when only one screw propelled the model; for since one screw propelled the model from 58 feet to 60 feet in sixty seconds with 600 revolutions of the screw, and with the two screws of the same pitch together, from 96 to 100 feet in the same time and with the same number of revolutions, there must, therefore, be at least 50 per cent more water pass through the tunnels in the same time, and the thrust given to the screw shafts must be in proportion to the quantity of water acted upon by the screws.

"I had the mouth of the stern tunnel enlarged to the extent of 50 per cent, and this enlargement came below the keel. This it might be supposed would be an obstruction and cause a considerable loss of speed, but I was agreeably surprised to find when I tried it that I had a gain of 20 per cent in speed. I had found by my experiments that, as the supply of water to the screw is diminished, the power required to revolve it increases, and the speed of the ship diminishes.

"There are three important points to be considered in screw ships, namely, the propeller, the ship, and the engine. In the first there has been no improvements with regard to speed since 1840; secondly, with respect to the ships, the best types of ships were described by the old builders as having a cod's head and mackerel's tail, the length equal to three to four times her beam, and no better sea ships have been built than our sailing frigates of former days; but since the introduction of the screw the shipbuilder has been obliged to arrange his plans to suit the propeller, for experience has shown the deeper the immersion the more effective the propeller, and consequently steamships are now being made with an enormous draft of water in proportion to the beam. The eel might now be taken for the type of modern screw ships, which are made in length ten to fourteen times the beam; and had it not been for the introduction of iron for building ships, the screw would never have succeeded to the extent it has done. This great increase of length gives the shipbuilder no chance of improving the form of his ships, from a naval architectural point of view, which is not the case in my system, as whatever form or type the ship will be best for sailing will also be the best for the adoption of bow and stern screws.

"The great improvement in steamships during the last thirty years is to be found in the engines, from which about three times more indicated power is obtained now, with the same consumption of fuel than formerly, as well as other important improvements that have been made in this department.

"My attention was first drawn to the necessity of having bow and stern screws, on account of the danger attending the employment of ships of the enormous length in proportion to their beam; for every sailor must be well aware that, should an accident occur to the machinery in a heavy sea, or on a lee shore, there would be but a poor chance of saving the ship, especially if one of these long ships, with its machinery disabled, should get into a trough of the sea. I expected that the shipowners would have readily availed themselves of my arrangement on account of the safety it offered to the ship and passengers, and also that the Admiralty would have seen and promptly recognized the advantage and safety it would have been to the ships of war. Now that the high price of coal is being felt by the shipowners they may be induced to consider whether it will not be to their interest, as well as for the protection of their passengers, to

adopt my system. In this paper I have confined myself to the advantages gained in speed or the saving of fuel by my system; but I will briefly name eight other important advantages in connection with it. (1) Thorough protection to the propellers. (2) Smaller screws and engines only are required. (3) No vibration whatever is produced by the propellers. (4) Ships so fitted can be stopped much sooner in case of danger. (5) There will be no loss of speed through racing of the engines. (6) Greater facility for steering and maneuvering. (7) Greater safety through dividing the power. (8) Ship can carry more canvas, and sail better. To sum up the result of my experiments, I find that to obtain the advantages of my system the propellers must be placed in tunnels, by means of which an extra supply of solid water will be kept up to the propeller, which cannot be effected in open water, and the extra supply of water can be obtained by using the bow and stern screws together, or by single screw ships, either at the bow or stern tunnels, by having the tunnel mouths enlarged or bell-mouthed. It may be thought there would be a loss of speed through the friction of the water passing through the tunnels when the ship is under canvas only, which, however, is not the case."

It is proper for us to add that Mr. Griffiths' conclusions appear to be based upon experiments with small models, which may have led to deceptive results as compared with trials upon ordinary vessels. The subject is one of interest and we shall notify any progress made by thorough and practical experiments.

Skin Grafting.

Dr. R. J. Levis, of the Pennsylvania Hospital, gives, in the *Medical Times*, an interesting article on this subject. The operation of skin grafting, he says, is now conclusively accepted as one of the resources of surgery.

The utility of the transplantation of minute pieces of skin, to granulating surfaces, has been demonstrated in a vast number of instances. It is admitted that, by creating centers of eccentric cicatrization on extensively ulcerated surfaces, the rapidity of the healing process can be much increased. Ulcers of a chronic character, which have obstinately resisted cicatrization in a concentric direction, can be healed by the ingrafting of new centers of germination in the midst of the areas of ulceration. Experience has also shown that the procedure is applicable to plastic surgery in facilitating the cicatrization of surfaces denuded by gaping in the division of cicatrices, and in the sliding of flaps of integument.

Besides the increase in the rapidity of healing, due to extending the lines of cicatrizing edges, a decided and important physiological influence is exerted by the presence of the grafts on ulcerated surfaces. The surface of an indolent ulcer seems to be stimulated to renewed vital action, and the increased healing impulse even influences to active germination the peripheral limits of an ulcer in which granulation has long entirely ceased.

The utility of skin grafting has, in my observation, been in no instances more demonstratively shown than in cases of extensive denudation caused by destruction of skin, as in burns, and loss of large areas of integument from traumatic injuries. In the case of a man whose back was extensively charred at a lime kiln, while lying under the toxic influence of its emanations, the sloughing integument having left an immense area of ulceration over his dorsal and lumbar regions, the successful ingrafting of numerous minute pieces of skin healed the vast ulcer with astonishing rapidity. In an instance of the entire loss of the skin of a leg, caused by deeply burning with coal oil, which had filled a shoe and saturated a stocking, the healing process was by the same procedure rendered as surprising and satisfactory.

It seems now probable that amputation, which, as a final resource, is by surgical authority justified in certain cases of extensive ulcers of the leg which all expedients have failed to heal, may be substituted by the simple device of skin grafting.

All of the conditions essential to successful skin grafting I have not, after extended observation, fully determined. The most favorable condition for the development of the grafts is certainly that of healthy, active granulation of an ulcer; and the more nearly this state is approached, the greater, as a rule, will be the success.

One of the beneficial claims for skin grafting is with reference to the avoidance of the eventual contraction which disfigures, deforms, and impairs motion after extensive loss of integument. Observation seems to show that where cutification is rapid from a number of skin forming centers, the resulting cicatrix is less violently contractile in its tendency.

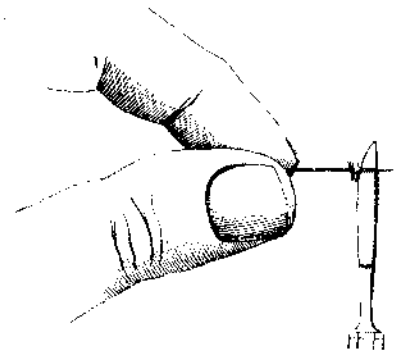
For successful skin grafting, it is simply essential that a minute portion of skin be removed from a sound part of the body of the patient, or from another individual, and placed on an ulcerated surface. It is customary to take the pieces to be transplanted from the patient's own skin; and I have generally chosen locations where the derma is thin, and not densely covered with cuticle, as on most of the front of the body, and, as a choice, from the inner surfaces of the arms and thighs. Grafts from the integuments of other individuals develop as readily, and I have frequently practiced removing them from limbs amputated for traumatic injuries, with apparently equal success. To avoid the possibility of conveying some form of specific infection by the process, it is certainly, as a rule, most advisable to transplant only from the patient's own skin.

A graft of skin should merely consist of the simple structures of cuticle and derma, and should avoid the underlying fatty and connective tissues. That even the whole thickness of the derma is not essential is demonstrated by the fact that successful grafting has been effected by using mere scrapings of the cuticle, in which are contained some cells of the superficial or papillary layer of the derma; but the practice is uncertain, and has not practical merit. The thickness of the true skin on the front of the body, it should be borne in mind, does not average more than from a quarter to half a line, and this depth should never be exceeded in the removing of grafts.

The operation of removing the portions of skin for grafting may be done by a knife or scissors, cutting off minute particles of the size to be used immediately in transplanting; or by taking a larger piece which is to be afterwards subdivided. I have adopted a method, first suggested to me by Dr. C. H. Thomas, of Philadelphia, which, for simplicity, convenience, painlessness, and effectiveness, may well displace all others.

It consists, as seen in the illustration, in merely penetrating the cuticle with a very delicate sewing needle, elevating a small point, and shaving off the minute elevation of cuticle and upper stratum of derma with a very sharp knife. The same may be accomplished, but hardly in so perfect and painless manner, by using fine scissors for the excision of the portion transfixed.

The operation, if properly performed, should be free from really painful sensation, and patients never object to its most frequent repetition. I have frequently done it without more than a tint of discoloration from blood, and blood need never actually flow from the very minute wound.

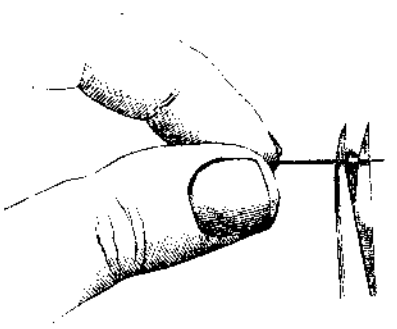


SKIN GRAFTING.

The graft is then immediately pushed from the point of the needle, and placed on the surface of the ulcer, the only care being to lay it with its epidermic surface upward. The graft need not be inserted into the granulating surface by making a wound for its reception, as has been advised and practiced, for such puncture allows a flow of blood that may elevate the graft from contact with the granulations.

As simple adhesion of the graft is all that is desirable, I have sometimes, with large and actively secreting surfaces, allowed them to be exposed to the desiccating influence of the atmosphere, so that the secretion may become viscid and hold the transplanted particles surely in position. To facilitate the same object of fixation after the grafts are deposited, I have occasionally allowed the ulcerated surface to remain uncovered until they became well agglutinated to it.

All active medication to the ulcer should be avoided, and the surface of ulceration be simply covered with a light pressing, for protection from disturbing influences. For this purpose the ulcer may be covered with a piece of muslin, saturated with oil or covered with cerate, or it may be merely protected with the waxed tissue paper, such as is extensively used for general purposes of a dressing in the Pennsylvania Hospital.



SKIN GRAFTING.

On most ulcers the dressing need not be removed for two or three days after the operation; but when secretion is profuse, the ulcer may be washed daily by allowing a stream of water to flow over it, carefully avoiding the wiping of the surface with sponges or cloths, which may disturb the grafts.

One of the earliest changes noticeable in the graft, after the first few days, is the detachment of its cuticle, which may occasionally be seen floating in the secretions of the ulcer, or it may be detached by a slight touch, leaving the true germinating material fixed in position. The graft, as it commences development as a germinal center, becomes so blended and identified with the granulations as to be for a time almost lost sight of, its re-appearance becoming evident in a bluish or lilac tinted pellicle, which indicates the progress of cutification.

In regard to the size of grafts for transplanting, I have, in several instances, grafted by removing, from recently amputated limbs, pieces of skin measuring one third or one fourth of an inch square; but such large pieces are very likely to fail in retaining their vitality, and I have had much more satisfactory success with quite small grafts; and for reasons already stated, this latter practice is certainly the best.

The number and position of the grafts will vary in accordance with the size of the ulcerated surface; and in large ulcers they may be distributed at short intervals, both centrally and near the periphery. Those near the circumference will stretch their granulations outward and stimulate the borders of the ulcer to activity; and with regard to the advantage of centrally located grafts, it will be well to remember their importance with reference to the difficulty often experienced in eventually healing the last of a chronic ulcer. A large ulcer, on which successful grafting has been performed, will soon present islets, from which cicatrization progresses in directions of the nearest healing points, until all are joined by an interlacement of newly formed tissue.

NEW BOOKS AND PUBLICATIONS.

A HAND BOOK OF THE LOCOMOTIVE, including the Construction and Management of Locomotive Engines and Boilers. With Illustrations. By Stephen Roper, Engineer. Philadelphia: Claxton, Remsen and Haffelfinger, 624-626 & 628 Market street.

The author of this work very truly believes that in a book, as in a clock, any complication of its machinery has a tendency to impair its usefulness and affect its reliability. Hence, in preparing a book which is intended to be a guide for the practical locomotive engineer, he avoids "mathematical problems and entangling formulæ," and offers a pocket volume, full of information, theoretical as well as practical, succinctly and clearly condensed. There are chapters on heat, combustion, water, air, gases, and steam; others on the construction of the locomotive and of its various parts, entered into with considerable details; instructions for the care and management of boilers and engines, tables of strength of materials, and useful practical hints for the guidance of the engineer. In brief, the volume is, as its name indicates, a hand book to which the locomotive mechanic can turn for information regarding almost every branch of his trade. It is neatly illustrated and bound in morocco, in convenient pocket book form.

Inventions Patented in England by Americans.

[Compiled from the Commissioners of Patents' Journal.]

From April 7 to April 13, 1874, inclusive.

ELECTRIC LIGHT.—M. Day, Mansfield, Ohio.
FIRE TELEGRAPH.—J. H. Guest, Brooklyn, N. Y.
FOOD FROM MILK.—B. Smith, San Francisco, Cal.
IRON, STEEL, AND FURNACE.—J. Henderson, New York city.
METAL ROLLING MACHINE.—H. W. Hayden, Waterbury, Conn.
OIL STOVE.—J. H. Thorp, New York city.
SOLE SCREWING MACHINE.—J. Mundell *et al.*, Philadelphia, Pa.
WATER CLOSET BASIN.—J. Burns, New York city, *et al.*
WATER METER.—H. F. Read, Brooklyn, N. Y.
WATER METER.—J. S. Swan *et al.*, Kanawha, W. Va.

Recent American and Foreign Patents.

Improved Railroad Signal.

Jane D. Evans, West Chester, Pa., executrix of Henry S. Evans, deceased.—This is an improved railroad signal, so constructed that the advancing train will itself set the signals to indicate its approach and departure. Two pairs of inclined bars are pivoted at the sides of one of the rails in such positions that the free ends of said inclines will be struck and pressed down by the wheels of the cars. The inner ends of the inclines of each pair are pivoted to opposite arms of a three armed lever, which is placed in a notch in the tie, with its third arm projecting downward. To each pair of levers is attached a chain, which passes over and is secured to a wheel formed upon the signals, which are pivoted to the upper ends of two posts. Either of said signals may be operated from the other, and both set or both withdrawn at the same time. The three armed levers are again raised to their former position, as soon as the pressure of the wheels is removed from the levers or inclines, by springs attached to ties.

Improved Rotary Harrow.

James W. Hanger and Joseph H. Ryan, Clinton, Mo.—This invention relates to means for adjusting the pivoted harrows, so as to cause one side thereof to work deeper in the ground than the other; also to a spring connection between the tongue and axle and a caster wheel, the same also supporting the driver's seat, whereby the weight of the driver effects little change in the pressure on the harrows in passing over rough ground, while yet exerting a constant spring leverage on the tongue; and lastly, to the means of adjustment for the pivoted axles of the harrows.

Improved Steam Boiler.

Joseph Shackleton, Rahway, N. J.—This invention relates to an improvement on the improved steam boiler upon which the same inventor received a patent dated April 5, 1870. The water receptacle is provided with a water induction pipe at the lower part, and a steam eduction pipe at the top. A system of pipes extends through in horizontal direction, and is arranged symmetrically to the horizontal axis of the system in such a manner that an intermediate series of pipes is placed diagonally between and sidewise of the adjoining series of pipes. Every two corresponding horizontal pipes are connected in vertical direction by elbows to form pipe rectangles, which extend gradually from the smallest innermost tier to the larger outermost series, each rectangle being placed in separate connection with the water receptacle. A horizontal plate is immediately below the upper pipes of the innermost rectangles, extending laterally to the full width of the receptacle, and causing the impinging of the fire thereon, so that it is deviated from its direct upward course toward the chimney at the top of the furnace and thrown sidewise, passing between and around the vertical pipes toward the upper corner of the rectangles, and thence along the top of the furnace to the chimney. The upper parts of the pipe rectangles are thereby fully brought into effective participation, and the heating power of the fuel and the gases of combustion utilized.

Improved Post Hole Digger.

James W. Thomson, Portland Mills, Ind.—The post hole diggers now known to the public have the ends of the blade or the two blades pressed farther and farther apart until the lowest portion of the cut is reached, and leave a long slip on one side of the tool uncut, in which are often roots that bind the parts of earth together. This causes these old tools to stick, and to be raised with so much difficulty that they are thereby rendered impracticable in actual use. To avoid this difficulty the ends of the tool are, in the present invention, caused to overlap each other, so that they are only in line, and end to end at the bottom of cut, every particle of the sides being thoroughly excised, and the whole core coming out clean and without obstruction from the sides.

Preparing Transfers for Panel Sign Painting.

Charles H. Gordon, Brooklyn, N. Y.—Paper is first covered with a coat of starch, then calendered, and another coat applied, followed by a wash of gum arabic. The whole is next covered with a coating of clear white varnish. When the varnish is thoroughly dry it is dusted over with French chalk, and the letters or figures printed from the first plate with strong clear varnish. Said letters or figures are dusted with first color, say gold or red. When dry, and all superfluous color cleaned off, the foundation for the next color is laid, say blue, using the same process as for the first color (printing in varnish), and so in each color, till the whole of the picture or sign is printed on the transferring medium. When quite dry a solid ground is printed, of white or color, which, when transferred to the panel, will form the groundwork or base of the picture, etc. After this has stood some time to dry, but before it is quite dry, it is laid on a smoothly planed panel and passed through a machine, which causes the printed matter to adhere to the wood. It is afterward slightly damped and the paper removed, when the whole, groundwork, color printing, and varnish will be found transferred to the panel. Any and every kind of printing, it is claimed, can be treated in the above manner, lithographic, letter press or the finest steel engravings.