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.

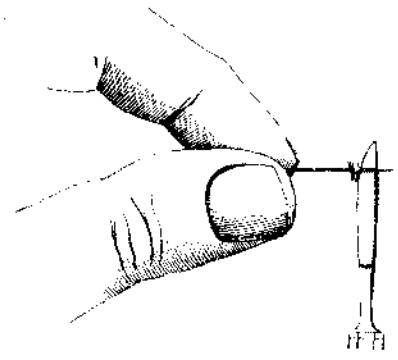
For successful skin grafting, it is simply essential that a minute portion of skin be removed from a sound part of the body of the patient, or from another individual, and placed on an ulcerated surface. It is customary to take the pieces to be transplanted from the patient's own skin; and I have generally 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.

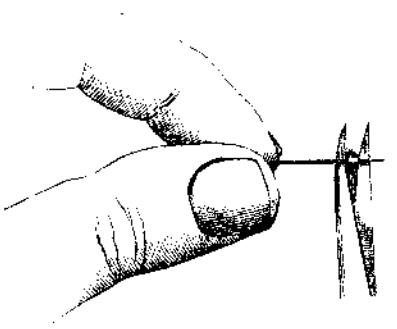


SKIN GRAFTING.

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.

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