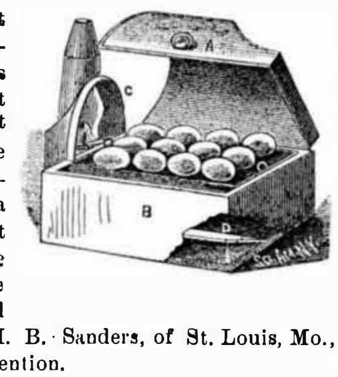
RECENT INVENTIONS.

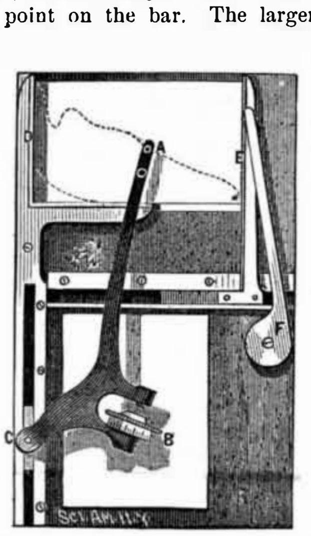
Egg Tester.

The box is provided with a perforated tray for receiving the eggs to be tested. A lamp, inclosed by a reflector and opaque chimney, is located at the end of the box, and the concave cover of the box acts as a reflector, throwing the light down upon the eggs. A mirror in the bottom of the box is placed at the proper angle to reflect the image of the eggs through the oblong slot in the top of the box at the front. This device enables a person to inspect the entire tray at a single glance, and it permits of testing the eggs as rapidly as the trays can be removed and replaced. Mr. Thomas H. B. Sanders, of St. Louis, Mo., is the patentee of this invention.



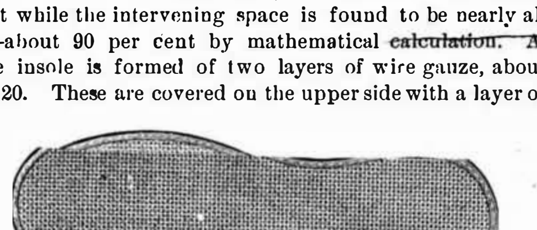
Instrument for Averaging the Breadth of Irregular Planes.

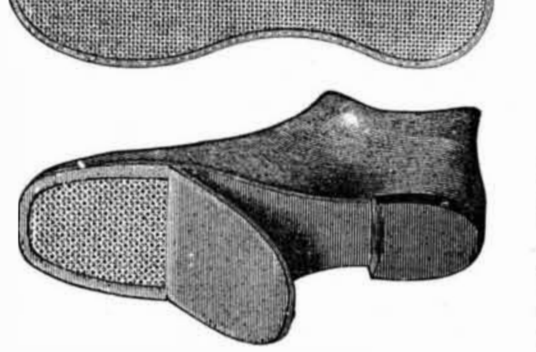
This instrument is especially designed for measuring the mean height of indicator diagrams taken on steam engines, but it has other applications. The table, which is of well seasoned wood, is faced with soft paper of uniform quality, adapted to receive the impression of the sharply cut edge of the graduated wheel carried by the bent bar. Metallic clamps, serving also as rulers, hold the diagram in position to be traced by the scribing point on the bar. The larger end of the bent bar is pivoted to a block sliding in a groove near the edge of the board. One of the rulers is provided with a T-head, which is received and guided by a transverse groove in the table. This ruler is retained in whatever position it may be placed by a flat spring pivoted to the table. To take the average height of a diagram the wheel is first turned to the zero mark, then the tracing point carried by the bent bar is moved so as to exactly follow the line of the diagram, beginning at the movable ruler and ending in the same place. The distance the wheel has turned is now noted, and the tracing point is moved upward along the edge of the movable ruler until the wheel is returned to its original position. The tracing point is then pressed into the paper and the length of the straight line thus traced will represent the average height of the diagram. This instrument is the invention of Mr. John Coffin, of Syracuse, N. Y.



The Air-Space Wire-Gauze Insole.

The proper protection of the feet is a subject all are interested in on account of its influence over the general health and comfort of the wearer. We illustrate here a novel arrangement for this purpose which possesses some peculiar advantages. If we lay together two pieces of wire gauze (tinned iron is used) so that the wires cross each other diagonally, and place them between two cards, the cards are held firmly apart while the intervening space is found to be nearly all air—about 90 per cent by mathematical calculation. A loose insole is formed of two layers of wire gauze, about No. 20. These are covered on the upper side with a layer of





canvas or leather, which is turned over the wire gauze at the edges and stitched through. This being placed in the shoe positively prevents the stocking from coming into contact with a wet shoe sole, and thus completely protects the foot by a medium which neither confines the perspiration, like cork or gum, nor absorbs and retains it, like felt. The stratum of air, being a non-conductor of heat, also tends to preserve the natural temperature of the foot, and by the motion of walking admits of ventilation. Two patents have recently been issued on this invention—one for the loose insole, the other for inserting the wire gauze in the shoe sole during manufacture, the principle being the same in both. The cuts clearly illustrate each, and for further information address J. Jenkins, Germantown, Philadelphia, Pa.

A Novel Fireless Locomotive.

Mr. Moritz Honigmann, of Grevenberg, has invented a traction engine, especially intended for use in streets, mines, and tunnels, or wherever the absence of noise, smoke, and disagreeable gases is desirable. The salient feature of his invention, says *Engineering*, is the use of caustic soda to absorb the exhaust steam, and to liberate a part of its latent heat to be employed in the production of additional steam to drive the engine. If exhaust steam at a temperature of 212 degrees be injected into a solution of caustic soda, of a specific gravity of 1·7, the temperature of the mixture will rise to about 374 degrees, while the vapor tension will not exceed one atmosphere. Supposing the hot solution to replace the fire in a boiler, it is evident that a part of its heat will travel through the plates to the water, if the temperature of the latter be lower than that of the solution, and will evaporate a portion of it, and that this action will continue as long as the soda maintains its power of absorbing the exhaust steam without giving rise to any great back pressure. Mr. Honigmann's engine is at work as a tramway locomotive, and will run continuously for five hours with a charge of 500 kilos of caustic soda of 1·7 specific gravity. The following description of its mode of action is taken from our contemporary, *L'Ingenieur Conseil*. Mr. Honigmann's motor has a small boiler, but no chimney. The boiler is a cylindrical reservoir of water heated to a temperature corresponding to the pressure desired, and surrounded with another reservoir filled with caustic soda, either in a state of solidity, or of highly concentrated solution.

Now, it is well known that caustic soda is a substance having a great affinity for water, with which it forms a hydrate. In the formation of this chemical combination a considerable quantity of heat is liberated, and Mr. Honigmann has drawn up tables of the boiling points and corresponding effective pressures of different strengths of the solution of caustic soda, from which it appears that a solution of 60 parts of water to 100 parts of soda can absorb vapor at a tension of 7·1 atmospheres, given off by water at a temperature of 167 degrees Cent. (332·6 degrees Fahr.), without in its turn giving off vapor having a greater tension than one atmosphere. It is therefore possible to absorb, by means of caustic soda, considerable quantities of exhaust steam, without creating behind the piston a counter pressure exceeding one atmosphere. Suppose, therefore, that the supply pipe of the steam cylinders communicates with the reservoir of water heated, for instance, to 166 degrees Cent. (330·8 degrees Fahr.), and therefore at a tension of 7 atmospheres, and that the exhaust pipe passes into the reservoir of caustic soda, itself heated by the vicinity of the water to a temperature of about 140 degrees Cent. (284 degrees Fahr.), it will follow that as soon as the valve is opened the pressure will diminish in the reservoir which contains water and steam, the water will give off a certain quantity of steam, which, after it has done work in the cylinders, will pass into the reservoir of caustic soda; the steam will heat the solution and be absorbed by it, a certain amount of heat being liberated in the process, which will raise the temperature of the solution, and the general result will be that the temperature of the solution will rise, and that of the water fall.

The difference becomes constant as soon as the amount of heat returned by the solution to the water, through the partition that separates them, becomes exactly equal to that converted into work in the cylinders. Mr. Honigmann had two thermometers placed upon his trial engines, on which these variations of temperature could be exactly followed. Suppose, again, that the work done in the cylinders is 300 kilogrammeters (2,100 foot pounds) per second, which corresponds to 4 horse power, there will be, according to the mechanical theory of heat, an absorption of

$$\frac{300}{424} = 0·7 \text{ calorie per second.}$$

The steam, therefore, which issues from the boiler, parts with 0·7 calorie of its heat in the cylinders, and carries the rest into the solution, and in chemically uniting with the latter, it develops additional heat. Now if the latter quantity be equal to the 0·7 calorie lost, and if the difference of temperature between the water and the solution be such as to permit it to pass through the partition, the temperature of the water will be kept up, and the pressure maintained. This is exactly what takes place if the dimensions of the two reservoirs and the quantities of water and of solution have been suitably proportioned. The full work is obtained from the engine, and all the heat which is not transformed into energy is stored up in the caustic soda, while the water is vaporized without any notable variation in the pressure. An observer placed upon the engine will notice that when the locomotive first starts, the pressure falls rapidly for about one atmosphere, and then remains fixed; but if the engine is stopped, it falls a little, and rises again as soon as work is resumed. In order to put the engine in working order again after the caustic soda has ceased to be sufficiently concentrated, all that is necessary is to refill its reservoirs with water and soda solution under the original conditions. The moisture absorbed by the caustic soda can be driven off again by evaporation, and the solution thus restored to the necessary degree of concentration. This is done in the central station, where the engines receive their supplies, at an expenditure of 1 lb. coal for every 10 lb. of water evaporated. Compared with other fireless engines, Mr. Honigmann's is exceedingly economical. The author of the article from which we quote estimates that in order to do the same work, an engine on the best system now in use would weigh 10 tons 16 cwt., where one of Mr. Honigmann's would weigh only 4 tons 18 cwt.

Reducing Fat by Exercise.

As a general rule it may be said that the most effective exercises for reducing weight are those which act most effectively on the respiratory organs. Running, for instance, is far more quickly effective in this way than walking, though quick walking is a very excellent exercise for the purpose. A steady run taken every morning before breakfast, and another taken every evening shortly before retiring to rest, will be found to produce a marked effect on undue, deposits of adipose tissue. But here a word of caution should be repeated. To any one who is thoroughly out of condition, especially if he has long been so, running is rather a dangerous exercise. To run a couple of hundred yards at a moderate rate might do serious injury to a man well advanced in middle age who has long been fat and unwieldy. But even a man of forty not very much out of condition, who has for several years taken little active exercise, ought to be careful how he starts to run more than a few hundred yards, except at a very moderate pace. The best plan is to begin for a week or two with about two hundred yards (unless very heavy) run steadily, but each day a little more sharply. By the time that distance is run at a good sharp pace, the second wind will come easily. Then the distance can be safely increased, until after a while the morning and evening run is from half a mile to a mile in length. It is well to walk out whatever distance one proposes to run (pacing 200 hundred yards for instance at about a yard a pace) and to run home, going then to bedroom or dressing room to make any necessary changes of dress and to rub down. Although no man should consider himself in decently good condition if he cannot run half a mile at a moderate pace without being obliged to change his inside clothing (on account of the freedom with which he has perspired), yet a fat reducing man is not likely to get through his morning or evening runs without freely perspiring over his work. He should never suffer his wet flannels to remain on him to dry.

Riding and rowing are both good exercises for reducing fat, and tricycling is even better. Boxing, fencing, and single stick are also excellent. Bowling and quoits are good, and skittles first rate. Paterfamilias will find bowling for an hour or two to his boys at their cricket practice, very good exercise for reducing fat, and very pleasant if he chances to have any bowling skill. If he has not, then it would be perhaps rather wearisome. Capital exercise can be obtained by removing from a good sized room all easily breakable objects, and then playing with a light elastic ball, thrown in such a way against the wall that some activity is necessary to take it, either by catching or with stroke of hand or racket. In an open air court this is of course much better. And it is hardly necessary to say that lawn tennis, racquets, and all such exercises are excellent for reducing undue weight. But I am here specially considering those who, being unwieldy, are not particularly anxious to exhibit their unwieldiness before the eyes of friends and acquaintances by taking part publicly in such games as lawn tennis or cricket. Even rowing is not a very soothing exercise to the obese if the ubiquitous 'Arry welcomes the athlete's exertions with cries of "Well rowed, fatty!" or other uncomplimentary comments on his volume.

Taking too much exercise is a ready way of increasing fat—paradoxical though it may sound to say so. A man not in good condition will perhaps take two or three days of very active or even violent exercise, drinking so much more than is necessary, on account of the unusual solicitations of thirst, that he can register very little loss of weight. Then he "caves in" for several days, being used up and feverish. During these days he eats, drinks, and sleeps more than usual, takes less exercise even than he had taken before he thus suddenly roused himself to exertion, and ere he is quite himself again, he finds, on weighing, that he has added to his bulk instead of diminishing therefrom.

In regard then to exercise as to all other methods for reducing undue fat, we advocate moderation on the one hand and steady perseverance in well doing on the other. Do not go in for great feats of strength or endurance to be followed by long spells of rest, but for steady exercise, continued systematically. If the other methods for reducing weight be followed steadily and moderately, for weeks and months, not for a few days only, the weight will be reduced safely to its proper amount, the breath and spirits improved, and the value of life notably increased.

International Electrical Society.

An international society of electricians has been formed in Paris, France, under the presidency of the Minister of Posts and Telegraphs, the society to be universal, and not confined to professional electricians; but it is intended to include all persons who are interested in the advancement of electrical science. Correspondence may be addressed to the Organization Committee of the Society of Electricians, 99 Rue de Grenelle, Paris.

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