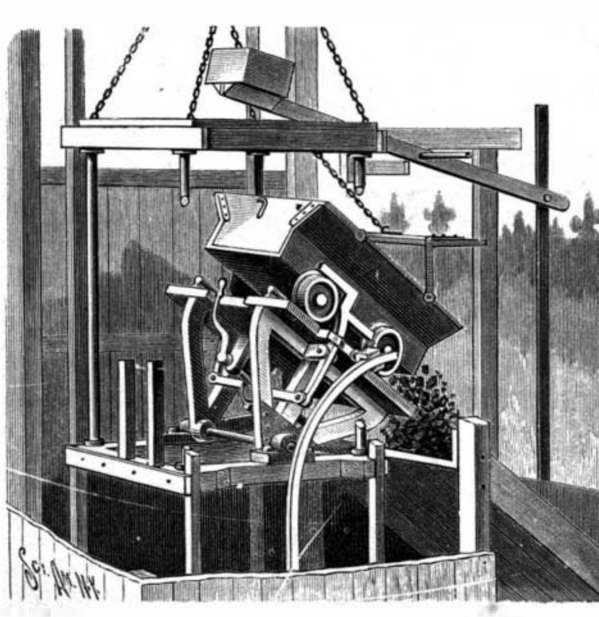
fitted up on each side, by means of movable frames in which they revolve. At one end of each roaster shaft is a gearing wheel which connects with a piece of shafting running the length of the ovens in the rear. This wheel geared to another on the rear shaft causes the roaster to revolve. From 200 to 400 pounds of dried chicory is put into a roaster with a quantity of olive oil or fat to prevent it from burning, where it revolves over a coke fire for about 1¾ hours, at the rate of 12 to 16 revolutions per minute. An iron carriage running on a track is then wheeled directly in front of the oven; the iron frame with roaster is then drawn from the oven on to the carriage, which is the same height and width as frame, and then wheeled away to the cooling floor, where the roaster is emptied and refilled again with dried chicory and run back over the track again to the oven, where it is replaced over the fire. The cooling floor is made of brick or cement and is about 30 feet square. After cooling, the chicory is put into the grinding machine. The material passes down through a hopper and between the teeth of a number of 8-inch rolls, which crush and grind the material into small particles, which is then conveyed by means of traveling cups to a wire bolt. The bolt is about 20 feet in length, the meshes of which run from about 4 to 40 to the inch. The ground material passes into this bolt, which revolves at the rate of 28 to 30 revolutions per minute, separating the fine particles from the coarse, which falls or sifts down through the netting to the openings at the bottom, and into the bags below. It is then packed into barrels and is ready for the market. In this country coffee is adulterated with about 2 per cent of chicory. Chicory is imported to this country in 100 to 150 pound bags, the average price being about 2½ cents per pound. Ground chicory brings about 5¼ cents per pound. The annual importation of chicory amounts to about 10,000,000 pounds. In San Joaquin County, California, about 400 acres are raised, furnishing in good years a profit of about $300 per acre. The root when dried brings about $200 per ton. The sketches were taken from the plant of the American Chicory Manufacturing Company, Jersey City.

APPARATUS FOR DUMPING COAL CARS, ETC.

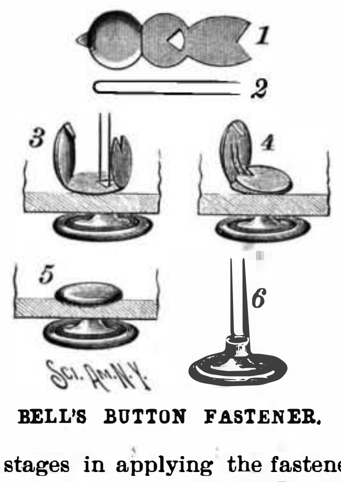
This is a strong and rapidly working apparatus, for use in connection with an ordinary car, to automatically dump the load into a chute when the car has been raised to the required height. It has been patented by Mr. William H. Barrett, of Weir, Kan. The elevator cage is operated by cables in the usual way, and carries a dumping platform mounted on tilting frames, the platform having tracks on which the ordinary dumping car may be run. The car is held in position by swinging clamps on opposite sides of the car, with arms engaging the flanges and faces of the wheels, the clamps being fulcrumed on the sides of the platform, and having lower projecting ends pivoted to connecting rods extending beneath the car to a connection with an eccentric on a shaft journaled in bearings beneath the platform. The latter shaft has levers or arms which project above the platform, and by means of these levers the clamps may be swung in or out. The dumping of the car is effected by guides on opposite sides of the elevator well, the guides curving outward toward the chute, and being clasped by shoes on opposite sides of the tilting platform. When the car and the platform are in a horizontal position the rear end of the car rests on posts on the cage, and the load is placed a little behind the center of gravity, so as to keep the car level. The car has at one end a swinging end gate engaged by a chain extending from the top of the cage, whereby the gate will be held up as the car is tilted in dumping, the gate again dropping to place as the car returns to horizontal position. The chute is also provided with a gate supported from the outer end of a lever on the inner end of which is a weight normally holding the gate raised. The inner end of the lever, extending into the elevator well, is lifted by the cage to close the chute at the time that the car is dumped, and the load is thus retained in the chute until the car starts downward, when the weight drops and the gate is lifted to permit the load to pass downward.



BARRETT'S DUMPING APPARATUS.

AN IMPROVED BUTTON FASTENER.

This is a simple device, readily applied for securing an ordinary style of buttons to garments. It has been patented by Mr. Robert Mowry Bell, of Santa Cruz, Cal. Figs. 1 and 2 show the clamp plate or blank and the fastening wire, Figs. 3 and 4 illustrating



BELL'S BUTTON FASTENER.

progressive stages in applying the fastener, the completed stage being represented in Fig. 5. The fastening wire, in the form of a staple, is passed through two of the holes of the button and through the fabric, a collar being employed as shown in Fig. 6, where desired. The ends of the wire having been passed through the nearly central opening in the clamp plate, the ears at each end of this plate are then folded down upon the central portion, the wire lying in the notch in one ear, and the tongue on the outer edge of the other ear being bent down under the central portion. The invention also provides for some variations in the form of the blanks.

Professor Dewar on Liquid Air.

It is said that Faraday, when he was asked what was the use of certain of his discoveries, retorted with the conundrum, "What is the use of a baby?" Professor Dewar recently, at the Royal Institution, attempted to answer the question in a different way, by showing that liquid air—produced with so great an expenditure of time, skill and money—had distinct uses, although those uses were scientific ones, and were useful only as establishing a basis for new scientific theories or as confirming old ones.

The first scientific hypothesis to which he alluded was that as the metals decrease in temperature so they increase in conductivity; so there was every reason—and the experiments with liquid air had multiplied the number and increased the cogency of these reasons—to suppose that when the temperature of absolute zero of minus 274 deg. C. was reached, then the metals reached the point of absolute conductivity. Next to this the lecturer alluded to the uses to which liquid air had been put in establishing and confirming the refractive indices of oxygen air and nitrogen, and then proceeded to answer a number of interesting (if not burning) scientific questions.

How long, for instance, does it take for the mercury in a Torricellian vacuum to vaporize? It vaporizes at once, as the professor showed by painting the outside of a newly created vacuum bulb with a sponge dipped in liquid air, when it was seen that a tiny mirror of mercury was instantly formed on the glass. Does a low temperature make any difference to the absorption of light by a colored surface? It certainly does. Professor Dewar showed that a surface painted with red oxide of mercury, when cooled by the liquid air, changed its color from bright red to orange. Organic coloring matter changed also, but not so quickly. Had a low temperature any effect upon the conductivity of a vacuum tube? Yes; it had. All the vacuum tubes which Professor Dewar painted with liquid air at once began to resist the passage of electricity through them, because the intense cold froze the vapor, which, though imperceptible and imponderable and otherwise undetectable, nevertheless was an aid to conduction. Does a low temperature increase the cohesive power of metals? It did, as Professor Dewar offered (by the proxy of his indefatigable assistant) to show by experiment to anyone who waited till after the lecture. The tensile stress of iron increased at the temperature of liquid air from thirty-four tons per square inch (at ordinary temperature) to sixty-four tons, and every other metal increased its cohesive qualities similarly. The last experiment but one of the lecture answered decisively the vexed question whether metals increased their magnetic qualities at these low temperatures by showing that an iron bar magnet did so to the extent of 50 per cent. The last experiment of the lecture answered no question in particular, but it was the source of the greatest satisfaction to the professor, and aroused a burst of enthusiasm in his audience, which included much of fashionable and nearly all scientific London. He first liquefied in a test tube some of the air of the room, and then—a *tour de force*—solidified it.—*Daily Graphic, London.*

Cement Mortar.

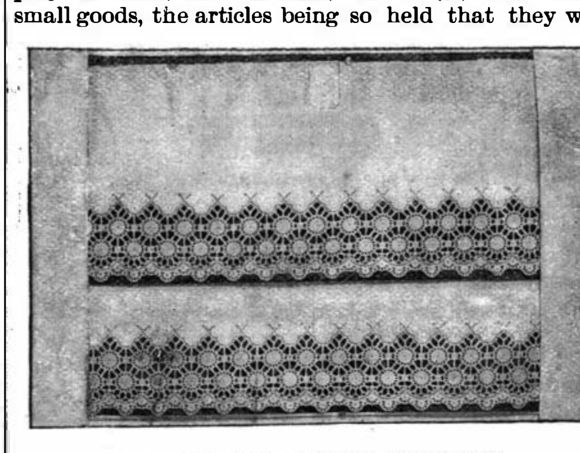
There is a common superstition, which probably retains its hold upon builders, says the *American Architect and Building News*, solely through the profit that they find in maintaining it, but which sometimes really imposes upon laymen, to the effect that cement mortar is improved, in cold weather, by the addition of lime to it. As the mason ingenuously explains to his employer, the heat developed by the lime in slaking keeps the cement warm, and thus prevents it from freezing; and, on this theory, the advent of a frosty day is utilized by multitudes of sharp builders to load the mortar, which they have agreed to make of sand and cement only, with a quantity of lime, which saves cement, and makes the mortar easy to work, but destroys its waterproof qualities and injures its strength and hardness more or less, according to the quantity used. It is hardly necessary to say that the influence of the lime in "warming" the mortar is purely mythical. Lime mortar, without cement, is not much injured by freezing, while cement mortar is totally ruined, so that a mortar containing a large proportion of lime would be harder, after freezing and thawing, than one containing cement only; but it would gain the qualities of lime mortar only as it lost those of cement mortar.

White Dextrine.

A writer in the *Wollen-Gewerbe* states that an entirely white dextrine, perfectly soluble in water, is now prepared by diluting 4 pounds and 6½ ounces nitric acid of 1·4 specific gravity with 317 quarts water in which 2,205 pounds of starch are stirred. This mass is formed into cakes, which are at first dried in the air and afterward at 176° Fahrenheit, and the cakes are then ground and the powder sifted, and heated from 212° to 230° Fahrenheit for one or one and a half hours; in external appearance, this preparation cannot be distinguished from starch flour, and is perfectly free from nitric acid. In the preparation of dextrine in the wet way, with diluted acid, it is remarked that the time at which the last of the starch has been converted into the dextrine must be carefully noted, as the continued influence of the acid causes the dextrine to become rapidly saccharose.

AN ENVELOPE FOR THE DISPLAY OF LACES, ETC.

This envelope is made of paper, cardboard, or other suitable material, in a very simple and inexpensive manner. Its sides are folded over part of the back from end to end, and from the back extend ends which fold over the sides at the ends, the ends having side flaps glued to the under side of the back. Openings or pockets are thus formed at the edges of the sides and ends, so that a portion of each piece of goods held by the envelope will be exposed for examination. The improvement has been patented by Mr. Charles J. Billwiller, Nos. 31 and 33 Walker Street, New York City, and is especially designed to facilitate the display of laces, embroideries, trimmings, and other small goods, the articles being so held that they will be kept clean and in good condition, and yet permit the retailer to cut off portions as desired.



BILLWILLER'S DISPLAY ENVELOPE.

Sour Bread.

L. Briant has investigated the nature of the acids contained in sour dough, and gives the results of a number of analyses. It appears that the bulk of the acidity of sour dough is due to lactic acid, but that a certain proportion, varying from one-third to one-fifth, consists of acetic acid, while in most cases the amount of butyric acid present is very small. In a future paper the author purposes dealing with the causes which lead to the production of sour bread.