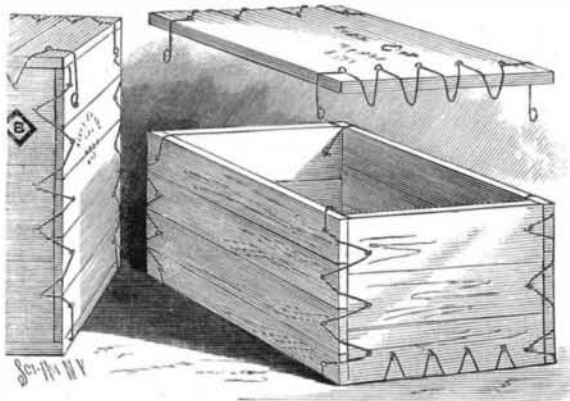


IMPROVED PACKING BOX.

Dry goods and packing boxes are weak at the corners, where the sides are nailed to the end boards, and to overcome this defect it is common to bind them with wood or sheet metal hoops. The invention here-with illustrated consists principally in substituting for these hoops a lacing of wire passed back and forth across the corners of the box, and having its bends se-cured to the outside of the box, and its ends passed over the edge of the box and secured to the inside, there-by rendering the box much stronger than the use of hoops would, and without adding much to the cost. The ends of the wire and the angles at each bend are held by staples. The cover has a wire at each end se-cured by staples, and bent to form loops that reach over the ends of the cover and fall below its lower sur-face; the ends of the wire are turned to form eyes. In applying the cover to the box, it is only necessary to



BEACH'S IMPROVED PACKING BOX.

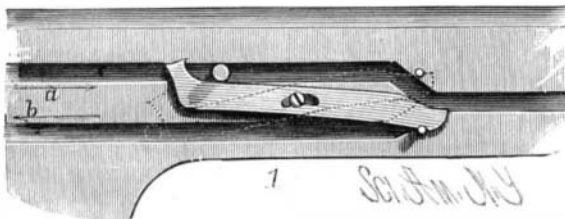
place it thereon and secure the ends and loops to the sides and ends of the box by staples. The box is thus stayed all about its corners in a very secure manner. The wires may be so bent as to bind each board, so that all the boards will be equally well adapted to sustain the contents of the box.

This invention has been patented by Mr. Wm. H. Beach, whose address for the Eastern and Middle States is 333 West 43d St., New York city, and for the Western States, 422 Wabash Ave., Chicago, Ill.

AUTOMATIC SWITCH FOR DOVETAILING MACHINES.

The device illustrated herewith is for automatically tilting the table on the reciprocating carriage of a dove-tailing machine. Fig. 1 is a view of the grooved side rail of a dovetailing machine with the automatic switch applied, and Fig. 2 is a sectional view, representing portions of the reciprocating carriage and tilting table. The grooves, *a b*, branch off from the other to form the upper and lower tracks for the pin of the tilting table of the carriage. The switch consists of a flat bar formed with a central longitudinal slot, through which passes a set screw, which serves as the pivotal connection with the side rail, the switch being so placed that its right-hand point projects slightly beyond the end of the single groove. The shape of the bar is plainly shown in the cut.

When the carriage is moving in the direction of the arrow, *b*, and the switch is in the position shown in the full lines, the pin will be guided into the groove, *a*. As the pin advances, it will slightly depress the heel of the



GARFF'S AUTOMATIC SWITCH FOR DOVETAILING MACHINES.

switch to break the connection between the notch in the switch and the lower limit pin; as it further advances, it will strike the curved pro-jection and carry the switch with it until the set screw strikes the opposite end of the slot. This move-ment overbalances the switch and causes

it to drop to the position shown by the dotted lines, where it is held by the upper limit pin. Upon the return of the carriage, its pin depresses the point of the switch, which returns to the dotted position after the pin has entered the central groove.

When the carriage again moves forward, the pin will be guided into the groove, *b*, simply lifting the heel of the switch in its passage. When the carriage returns in the direction of the arrow, *a*, it will move the switch until the other end of the slot strikes the screw, when the switch will assume the position shown by the full lines. At the next movement the pin enters the groove,

a. The pin thus moves alternately in the grooves, *a b*. The use of this device gives the operator the free use of both hands, thereby enabling him to do more work, and saves time and material, as he cannot possibly make mistakes by forgetting which way he has switched.

This invention has been patented by Mr. Christian Garff, of Logan, Utah Territory.

Blasting without Powder.—The Lime Cartridge.

Sir Frederick Abel, in his recent address before the Society of Arts, London, gave the following information:

The considerable and very rapid increase in volume which freshly burned quick lime sustains when slaked led, many years ago, to attempts to apply it to the bringing down of coal; but the idea did not assume a really practical form until Messrs. Sebastian Smith and Moore worked out a simple method of applying the lime so as to insure the effective operation of the disruptive force which it is capable of exerting, and to utilize the considerable heat developed by the ener-getic chemical union of the lime with water in the rapid generation and superheating of steam in some-what considerable quantity, thus supplementing, in an important manner, the force exerted by the expan-sion of the lime. The public has been made familiar, in last year's and this year's exhibitions, with the gen-eral nature of Messrs. Smith and Moore's lime cartridges, and of the system of using them; briefly, the freshly burned and finely ground lime is compressed into the form of very compact cylinders, and the introduction into a bore hole of a simple appliance, together with these lime cartridges (the hole being charged with them, and tamped in the ordinary manner), enables the operator to accomplish expeditiously the simultaneous ap-plication of water throughout the entire length of the charge.

Several holes, at suitable distances from each other in the face of the coal, are charged before the watering is taken in hand; they are then set into operation in rapid succession, and after the lapse of several minutes their combined action brings down the coal in large masses. The Commissioners witnessed the perform-ances of these lime cartridges at Shipley Collieries, in Derbyshire, soon after their successful elaboration; and the results of subsequent inquiries and experiments connected with this subject have convinced them that, for coal getting, the lime process can be, to a large extent, substituted for powder, and that its employ-ment secures comparative immunity from danger, and is unattended by any important practical difficulties.

In spite of the obstacles which have always to be surmounted by any complete departure from old practices and traditions, the lime system has gradually received more or less extensive trial in many of our mining districts, and also on the Continent, and has already taken firm root in some parts of Stafford-shire, Yorkshire, and Derbyshire, having proved itself capable of competing, and even advantageously in point of economy, with powder in many descriptions of coal, which are so worked as to allow of several charges being applied at one time.

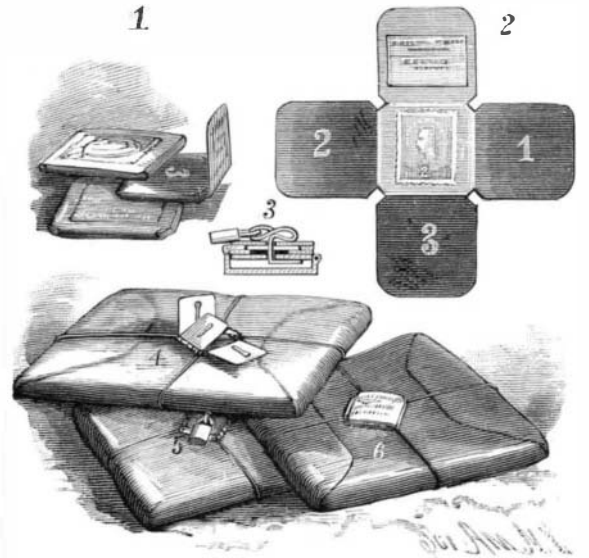
It is not contended by the elaborators of the lime-cartridge system that it affords the means of dispensing with the use of explosives or of specially power-ful mechanical appliances in the removal of stone, or even in some hard coal or in connection with cer-tain methods of working underground; but it is now beyond doubt that in many of the collieries where the prevalence of fire damp renders the use of the safety lamp imperative, the replacement of shot firing by the use of lime cartridges, while unattended by any increase in the cost of getting the coal, would reduce the risk of explosions to those arising from careles-sness on the part of the men, or from what should now become the very remote contingency of the use of unsafe or defective lamps.

Spirits of Turpentine.

This is one of the most valuable articles in a family, and when it has once obtained a foothold in a house, it is really a necessity, and could ill be dispensed with. Its medicinal qualities are very numerous; for burns it is a quick application and gives immediate relief; for blisters on the hands it is of priceless value, searing down the skin and preventing soreness; for corns on the toes it is useful, and good for rheumatism and sore throats, and it is the quickest remedy for convulsions or fits. Then it is a sure preventive against moths; by just dropping a trifle in the bottom of drawers, chests, and cupboards, it will render the garments secure from injury during the summer. It will keep ants and bugs from closets and storerooms, by putting a few drops in the corners and upon the shelves; it is sure destruc-tion to bedbugs, and will effectually drive them away from their haunts, if thoroughly applied to the joints of the bedstead in the spring cleaning time, and injures neither furniture nor clothing. Its pungent odor is retained for a long time, and no family ought to be entirely out of a supply at any time of the year.

FASTENING FOR TIED PACKAGES.

This fastening, made of paper or any other suitable material, is shaped as shown in Fig. 2; it is shown folded in Fig. 1, and attached to the cords of the pack-age in Fig. 6. The fastening incloses and secures the tied ends of the strings, so that the package cannot be untied or opened and tied up again without destroy-ing the seal thus formed. The several flaps are so shaped as to admit of the crossing of the cord between them without interfering with the edges of the flaps when folded or turned over one upon the other, as shown in Fig. 1. The flaps are provided with mucilage,



MCCARTY'S FASTENING FOR TIED PACKAGES.

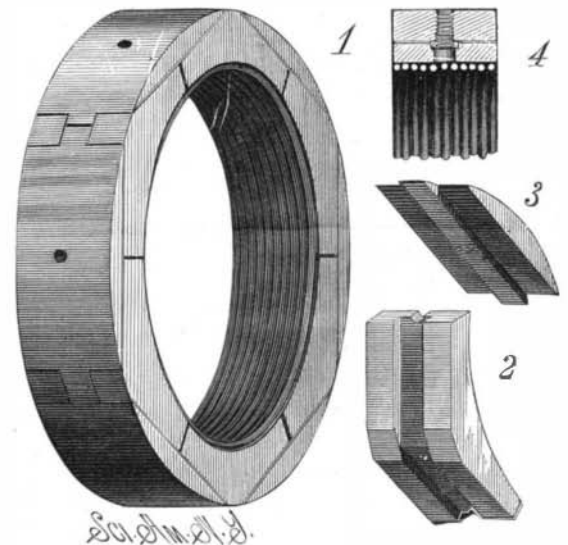
so that when turned down upon each other they inclose and securely hold the knotted ends of the string.

The fastening shown in Figs. 3, 4, and 5 is made of paper, metal, or other suitable material. Instead of being made of flexible material to permit the folding of the flaps, the latter may be hinged to the body part, which would then be made dish-shaped to receive the knot of the binder. On one flap is a turning staple, which passes through slots in the other flaps and re-ceive a lock. The package so secured can only be opened by destroying the fastening, cutting the binder, or bursting the package itself, or picking the lock. The wide applications of these devices and the security they afford are apparent.

These inventions have been patented by Mr. Michael McCarty, of Newport, R. I.

METALLIC PISTON PACKING.

The exterior faces of the inner blocks, Fig. 2, are angular, and have their apices rounded off upon the arc of the circle of the inside of the cylinder in which the packing is to be placed, as shown in Fig. 1. Grooves are formed in the central parts of the outer faces of the blocks, whose interior faces are concave on the arc of a circle. Plane convex segments, Fig. 3, are formed with tongues to fit the grooves of the blocks, and are curved to fit the cylinder. The packing is held against the cylinder by open-ring springs, shown in Figs. 1 and 4. The packing is secured between the piston head



PFLAUM'S METALLIC PISTON PACKING.

and follower in the usual way, and which close up the opposite sides of the packing and form a chamber. The interior of the packing is designed to be filled with tallow, which gradually escapes through perforations in the centers of the segments and ends of the blocks, so that the inner surface of the cylinder will be kept lubricated. With this construction the outer surface of the packing, as it wears, will always retain its cir-cular form, and will thus always remain in close contact with the cylinder.

This invention has been patented by Mr. N. Pflaum, 27 Front Street, Port Jervis, N. Y.

Lantern Condensers.

For many years a plano-convex lens, flat side next to the light, and a double convex of crown glass have been employed, but this is now being gradually supplanted by the two plano-convex lenses described. The most perfect system of this class is when the face of the lens nearest to the transparency is not quite flat, but slightly convex.

A great increase of illumination is often to be obtained by the interposition of a third lens between the light and the condenser. The form of this lens should be plano-convex, or, by preference, of a slightly meniscus shape, although, from such trials as we have made, we do not find any very marked degree of advantage in the latter. The gain in illumination arising from the employment of a supplementary lens, such as that described, was proved in one instance to exceed 30 per cent. But as this third lens will necessarily be close to the light, it must not only be placed somewhat loosely in its setting—to allow of expansion of the glass by the heat—but it must be warmed up slowly and thoroughly before being introduced into the lantern, otherwise the heat may cause it to crack.

The great object in a condenser is to collect the largest possible amount of light emitted from a burner, and cause it to be projected forward to the object glass in a manner as free from observation as possible. When the condenser consists of two lenses, the first one collects the rays of light which diverge from the flame, and transmits them in a nearly parallel manner to the second, its function being to converge them to a point at a distance equaling the position of the front lens of the object glass, or nearly so. If the eye were situated at the apex of this cone, it would perceive the whole of the condenser to be one mass of intense illumination, no one part being brighter than another.

It may be asked why one lens would not answer the purpose of a condenser instead of two. We reply that it is not possible to effect the transmission of a large angle of light by one lens alone. While some of the cheap toy lanterns have a single condenser of the "bull's eye" or hemispherical form, yet is the angle of light transmitted but small, owing to the spherical aberration of single lenses having short radii of curvature. Hence must a good condenser consist of at least two elementary lenses.

We may here observe that if the purpose of the lantern be the production of enlargements from negatives of cabinet or greater size, then must the diameters of the condensers be increased in a corresponding ratio. For purposes of this nature, the condensers may with advantage be eight inches in diameter.—*Photo. Times.*

Locomotive Cars for the Transcasian Railway.

The Russian government is having built, at the engineering works of M. Struve, at Kolomna, some locomotive cars of a special type for the Transcasian Railway, designed to meet two difficulties—the waterless character of a large section of the line and the insignificant ordinary traffic. To meet the former, the locomotive car is equipped with tanks containing sufficient water to last seventy miles. As the waterless stretch from Michaelovsk to Kazantchik is about fifty

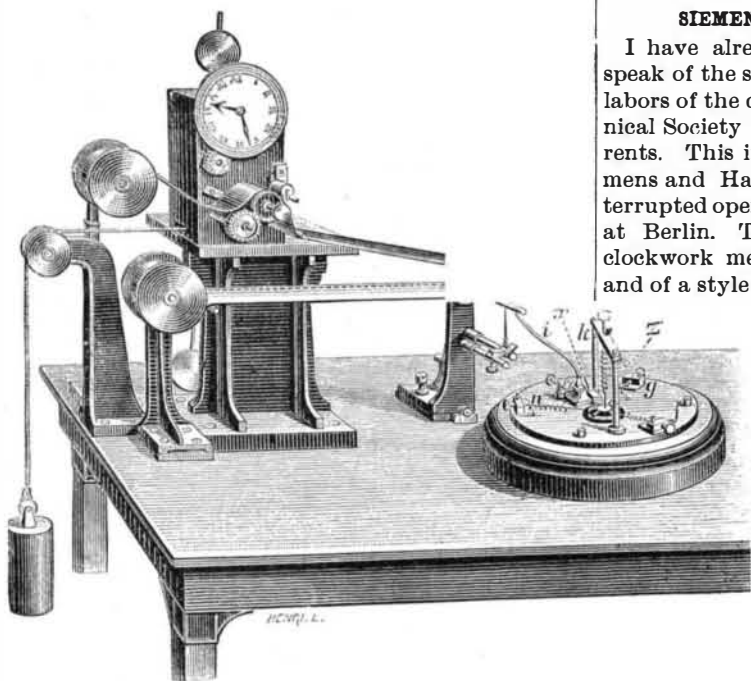
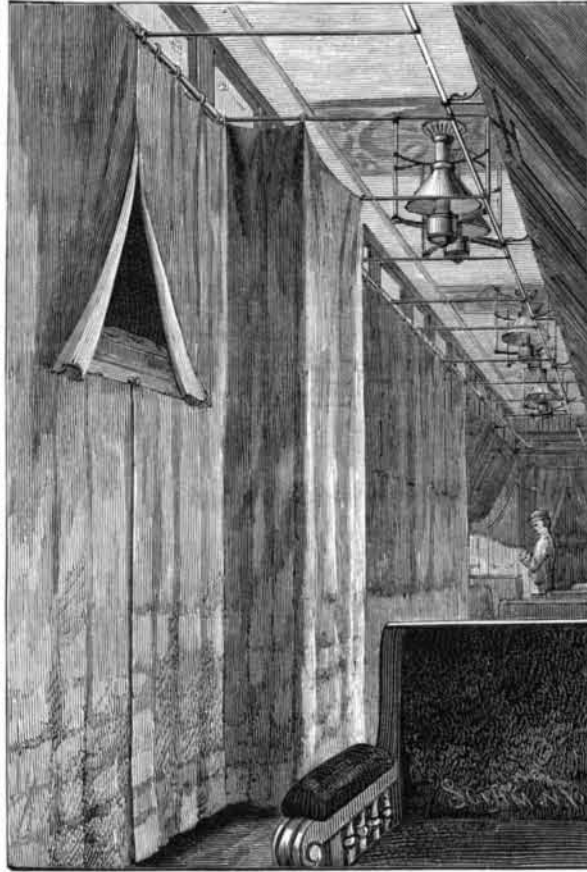


Fig. 1.—SIEMENS & HALSKE'S SOOT INDICATOR.

miles in length, this supply is expected to be amply sufficient under any contingencies that may occur. With regard to the second difficulty, the locomotive has been constructed with a car connected to it, and capable of conveying eighty passengers. The locomotive car will be warmed by the exhaust steam from the engine, and there will thus be an economy in the consumption of fuel—an important consideration in a country where no timber or coal exists, and where the winters are extremely severe.

MOVABLE DRESSING CLOSET FOR SLEEPING CARS.

The object of the invention herewith illustrated is to provide a shelter or screen for use upon sleeping cars of the Pullman model, whereby the occupants may stand upright in the aisle and dress without being within sight of other passengers. The closet is made by a curtain suspended from four hooks on stationary cross rods, and extends about one-third across the aisle,



MOVABLE DRESSING CLOSET FOR SLEEPING CARS.

leaving ample space for people to pass. The cross rods are about 30 inches apart, making the width of the closet, up and down the aisle, about the same. To close the closet, the hooks carrying the outer corners are moved up against the curtain rods of the car, thereby drawing the closet curtain up against the berth. The arrangement of the main curtains is clearly shown in the left of the engraving. Each curtain is cut back on the line of the upper berth about one foot; a hook on each corner is placed over the edge of the upper berth, so as to hold up the lower part of each curtain. It will be seen that the occupant of the upper berth can get in or out of the same without opening the lower curtains, while the movements of the occupant of the lower berth do not in any way interfere with his neighbor. The advantages possessed by this closet over the old style of curtains are apparent.

This invention has been patented by Mr. A. J. Chandler, whose address is care of C., I., St. L. & C. Railroad, Cincinnati, O.

SIEMENS AND HALSKE'S SOOT INDICATOR.*

I have already more than once taken occasion to speak of the soot indicator, especially apropos of the labors of the committee appointed by the Electrotechnical Society of Berlin for the study of telluric currents. This indicator was constructed by Messrs. Siemens and Halske, and has now been in almost uninterrupted operation for three years in the central office at Berlin. The apparatus consists essentially of a clockwork mechanism, which actuates a paper band, and of a style that marks the deflections (Fig. 1). This paper band is blackened every twenty-four hours. The tracings made by the style are fixed by means of a solution of colophony in benzine applied with a pencil.

Beneath the platform of the apparatus there is arranged an electro magnet, which is excited by 20 elements. This electro is shown in diagram in Fig. 2, where N is a solid piece of iron around which is wound an insulated conductor, whose extremities communicate with the poles of the battery, and which forms one of the poles of the magnet. The other pole of the magnet is concentric at N. Between S and N is placed a bobbin, whose winding is connected with the ground conductor. This bobbin is suspended from a spiral spring, z, and attached by wires to the points, j, g, and n (Fig. 1). The bobbin is so wound that the deflections of the needle, i, shall be proportional to the intensity of the current that is traversing it. The entrance and exit wires of the bobbin are attached to the terminals, j and g, respectively.

* Dr. Michaelis, in *La Lumiere Electrique*.

The apparatus is interposed in terrestrial lines as follows:

The ordinary cable that connects Berlin with Dresden is used. This consists of 7 insulated wires that are surrounded in a body by an insulating envelope. This latter is surrounded by non-insulated wire that serves to collect the telluric currents along its entire length. At Dresden, one of these copper conductors is connected with the winding wire, and at Berlin the apparatus is interposed in the metallic circuit thus formed.

When telegraphing is being done, the wires exert an induction upon each other, so that the curves traced by the apparatus consist of a succession of slight oscillations (especially during the day). The curves are extremely well defined.

Absorption of Nitrogen by Soils.

The remarkable statements of M. Berthelot respecting the fixation of atmospheric nitrogen by certain descriptions of soil have attracted considerable notice. M. Joulie has contributed to the *Comptes Rendus* an account of some carefully conducted experiments of his own which corroborate M. Berthelot's results. In these experiments, M. Joulie placed equal weights of soil in glass pots, watering the samples automatically with distilled water, and protecting the surface from any possible contact of ammonia-bearing substances, while leaving it freely exposed to the air. Different species of plants were raised from the soil under observation; the crops being at the end of every season dried, weighed, and analyzed. The soil also was similarly treated, in order to ascertain whether this and vegetation together had gained or lost nitrogen.

By operating in this way upon many samples of soil, tested during a series of years, M. Joulie has satisfied himself that nitrogen has been gained (often in considerable quantity) in two descriptions of soil—the one being a loam and the other a sand devoid of clay. The results have been very fairly uniform in quality, but differ in quantity. The bed of soil in these experiments was about one decimeter thick; and if it may be admitted that the same amount of fixation might take place over the area of a hectare of meadow and throughout a layer of the same thickness, the weight of which would be about 2,000 tonnes, the weight of nitrogen thus fixed would not be less than 1,144 kilogrammes. If the area of surface only, and not depth, is to be taken into consideration, the result would be to diminish the approximate fixation of nitrogen to 432 kilogrammes per hectare. In M. Joulie's opinion, this action is not to be attributed to any other cause than the direct absorption of atmospheric nitrogen; but he admits that a further series of experiments upon samples of soil without vegetation is necessary to clear up the only doubt existing on the point.

Cholera.

Henry Downes, M.D., Deputy Inspector-General of Hospitals, Springfield, Tiverton, England, says his experience of the disease enables him to deduce the following conclusions:

1st. That cholera is the result of atmospheric influences generated in localities in which numbers of men are assembled without due regard to sanitary precautions.

2d. That cholera is only an aggravated form of diarrhoea, and that its later symptoms are the result of the long continuance of this disorder and of a sudden loss of a large portion of the watery constituents of the blood, these symptoms being a shrinking of the whole body, blueness of the surface, cramp of the lower

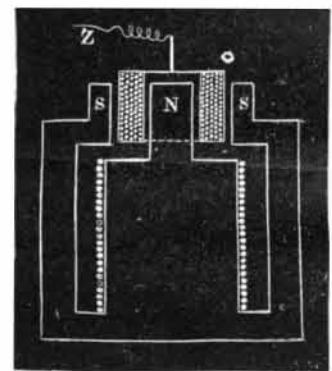


Fig. 2.—DIAGRAM OF ELECTRO MAGNET.

extremities, obstinate vomiting, diminution of the pulse, and gradual cessation of the heart's action.

The nature of the contagion, or in what manner it is received into the system so as to produce these results, has not been ascertained; but in my opinion it is most probably gaseous, existing in the atmosphere, and is received into the human body by respiration through the medium of the lungs. As long, therefore, as large numbers of men are assembled within a confined space, without due regard to sanitation, will cholera be produced, and prove fatal to many thus situated; and although up to the present day we are in possession of no antidote, there is one remedy which is often available, and that is immediate removal from the locality in which the disease is prevalent.