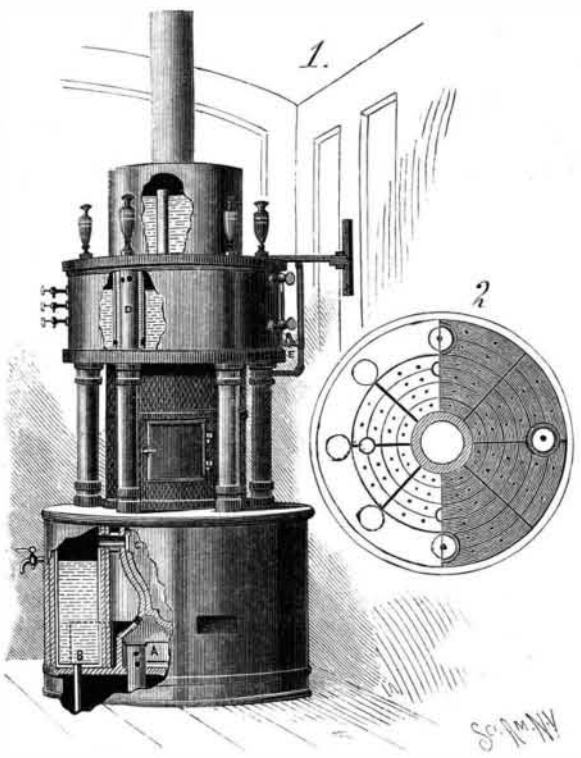
AN IMPROVED CAR STOVE.

A stove for heating railway cars, provided with appliances for extinguishing the fire in case of accident or of the extraordinary tipping of the car, has been patented by Mr. William P. Wheeler, of No. 814 West Madison Street, Louisville, Ky., and is illustrated herewith, Fig. 2 being a sectional view through the two upper annular water reservoirs. Within two annular plates on the base plate is a water reservoir surrounding the fire pot, under which air tubes, A, pass through the car floor, a pipe, B, from the reservoir providing for drainage when desirable. Heat-insulating material is placed between the reservoir and its surrounding plates, and the reservoir is divided perpendicularly by perforated partitions and horizontally by perforated shelves. To the top of the stove wall is fitted a ring which supports a second annular water reservoir, and pipes, D, extending through it, communicate with the reservoir below, these pipes surrounding long bolts which securely bind together the two reservoirs and the stove. Between the upper part of the lower reservoir and the fire pot, at A, are short tubes, with an automatic valve over the mouth of each, capable of opening by a slight pressure of water and closing by its own gravity, and the pipes, D, also communicate with these tubes. In the second reservoir each pipe, D, has a surrounding pipe, the inner and outer pipes forming

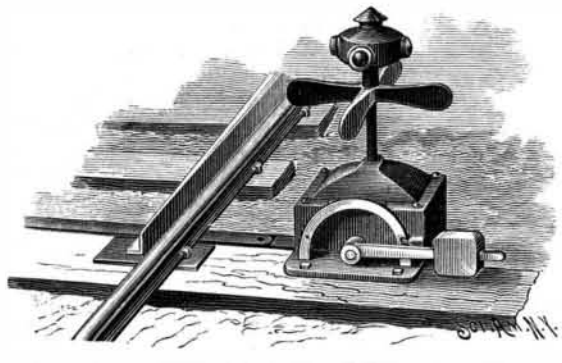


WHEELER'S CAR STOVE.

a siphon adapted to draw water from the reservoir when the stove is unduly inclined to one side, as by an accident or collision, when both reservoirs will be discharged into the fire pot at A. When the water is exhausted in these two reservoirs, by evaporation or otherwise, it is replenished from the upper reservoir by opening a valve provided for such purpose. The second reservoir has try-cocks at different heights, and a water gauge to determine the level of the water, and the two upper reservoirs have wave arresters to prevent undue movement of the water when the stove is in its normal condition.

IMPROVED RAILWAY SWITCH STAND AND SIGNAL.

An improved switch stand, in which the signal is automatically changed as the switch is moved, has been patented by Mr. Nathaniel W. Boyd, of Steelton, Pa., and is illustrated herewith, as applied to a point or split switch, a different application of the improvement having been illustrated by us in a former number. The principal operative portions are inclosed in a metal case, to exclude dirt, snow, ice, etc., there being spaced ribs in the bottom of the casing, and a

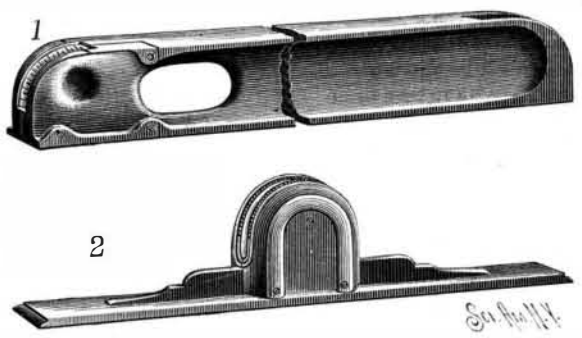


BOYD'S RAILWAY SWITCH STAND AND SIGNAL.

friction roller, upon which slides a rack bar projecting through slots in the casing and connected with the switch bar, which extends under the main rail to the switch points. The stand is mounted directly upon a single tie or sleeper, and may be set up on either side of the track, a half revolution of the lever giving the signal shaft a quarter turn, whereby the different colored sides of the lantern or wings of the semaphore are displayed.

AN IMPROVED SPIRIT LEVEL.

A level designed to be in condition at all times to indicate a level or plumb, or any required angle, without



HUTTON'S SPIRIT LEVEL.

the manipulation of set screws, etc., and wherein the vial is so set as to be absolutely protected against hard usage, has been patented by Mr. James C. Hutton, and is illustrated herewith, two forms of construction being shown. The ends of the main frame, in which the vials are set, as represented in Fig. 1, are divided into two sections, one of which is detachable, the fixed section having a circular recess, a segment of which is countersunk for the reception of a bed of plaster of Paris to receive a vial case. The latter is circular, and made in sections, with a segmental depression and central aperture for a pivotal screw, by which the vial case may be revolved when it is placed between the case sections, to bring it in proper position between the plumb and level marks on the top and end edge of the frame, there being degree marks upon the surface between these points. The vial case, as well as the case sections, provide for the thorough and accurate embedding of the vial in plaster of Paris, whereby a strong, durable, and immovable setting is obtained. For greater convenience in some kinds of work, Fig. 2 shows a construction in which the vial is located centrally, and in which the bead may be seen from either side. The vials used may describe a true half circle, or be made more or less of a horseshoe form. In this kind of level, no matter what the inclination or how the instrument is placed, the degrees may be readily observed and the bead seen.

For further information relative to this invention address Mr. James C. Hutton, of Corvallis, Oregon, or Mr. Patrick J. McElroy, of East Cambridge, Mass.

Spanish and Italian Ships Built by the English.

The three new cruisers for the Spanish government are to be built at Bilbao by the Barrow Shipbuilding Company, which has started a branch establishment at that place. The Spanish government insisted upon building the vessels in Spain, and this will now be accomplished; but they will not be built by Spaniards all the same. The Barrow Company is now designated "The Naval Construction and Armament Company, Limited," and will undertake the manufacture of ordnance as well as the construction of war ships. It is worthy of remark that although these cruisers, which are to be very powerful and steam at a high rate of speed, are to be built at Bilbao in Spain, yet the whole of the machinery, boilers, torpedo boats, Whitworth and Nordenfelt guns, are to be supplied from Barrow.

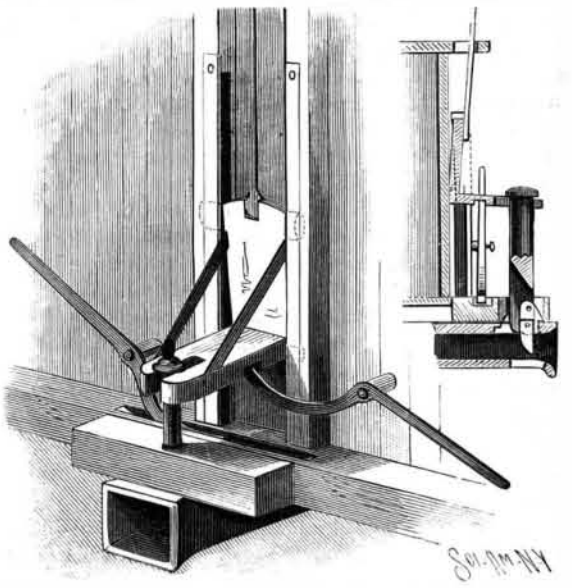
The Italian government are adopting a similar course in regard to the construction of steam machinery for their monster armorclads. Having determined to make their engines and boilers at home, their intentions are fulfilled by intrusting the contract to a branch, established at Naples, of the Tyneside firm of Hawthorn, Leslie & Co., under the name of the "Societa Hawthorn-Guppy." This branch of the Newcastle firm are now making twin screw engines of 23,000 horse power for the armorclad Sardeque; but in this case also, the design and all the principal castings and forgings are being supplied from the parent establishment in this country.—*Broad Arrow.*

The Radio-Microphone.

Mr. C. Vernon Boys has described before the Royal Society an instrument for measuring very small changes of temperature. "It is an extremely delicate form of thermopile, consisting of a square frame made of one turn of one square centimeter, of which three sides are thin copper wire, and the fourth is a compound bar of antimony and bismuth, each piece being $5 \times 5 \times \frac{1}{6}$ mm., soldered edge to edge. This frame is supported by a thin rod to which is fastened a mirror, and the whole is hung by a torsion fiber in the field of a powerful magnet. When radiant energy falls on the center of the compound bar, the frame is deflected, and the amount of deflection measures the energy. Adopting suitable dimensions, and using a very strong field, an instrument may be made capable of showing a change of temperature of the junction of one thousand-millionth of a degree."

AN IMPROVED CAR COUPLING.

A car coupling designed especially for use in connection with freight cars, and in which the parts are so arranged that the cars may be coupled or uncoupled from the sides or top, has been patented by Mr. Samuel Byrne, of No. 158 Robert Street, Toronto, Canada, and is illustrated herewith, the small figure showing a central longitudinal section of the coupling. The end of the car is provided with vertical ways, in the grooves of which is mounted a slide having upper and lower guiding lugs, the slide carrying on its lower end an outwardly extending plate, slotted to receive the shank of the coupling pin and transversely grooved to receive the lower ends of levers loosely mounted upon studs at either side. The ways are formed with recesses adapted to receive the lower guiding lugs of the slide when it is lifted by either of the levers at the side, as shown in the perspective view, to maintain the pin in raised position, the handle of the lever, as it is thrown downward in moving the slide, being also moved outward from the car body. The lower end of the coupling pin is also provided with a gravity catch, engaging a shoulder of the drawhead, to be used in arranging the coupler for coupling cars automatically, the slide being then lowered sufficiently for such purpose, when a link within the drawhead may be pulled out, but an entering link will cause the pin to drop and engage such

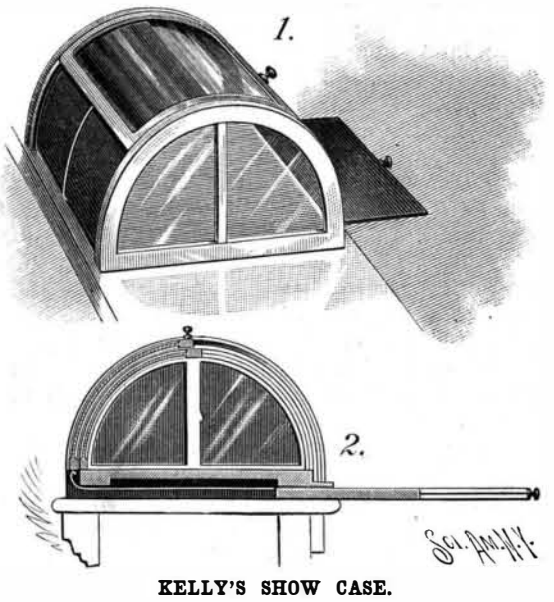


BYRNE'S CAR COUPLING.

link. A handle extends upward, whereby the slide may be operated from the top of the car, as well as by the levers at the sides.

AN IMPROVED SHOW CASE.

A show case having a shelf operating in connection with a sliding cover, and designed to be strong, durable, and attractive, has been patented by Mr. James J. Kelly, of No. 130 Lark Street, Albany, N. Y., and is illustrated herewith, Fig. 2 representing a central transverse section of the show case and shelf. The body of the case is segmental in contour, having an inner fixed bottom and an outer bottom which may be conveniently attached or detached to facilitate cleaning. The outer bottom is recessed, and has grooved side walls, to receive a shelf with tongued ends sliding in the grooves, while a half cover is rigidly secured in the segmental end pieces of the frame. The end pieces project beyond this cover, and in the extended portion are grooved to receive a sliding half cover, both covers being adapted to hold frames of



KELLY'S SHOW CASE.

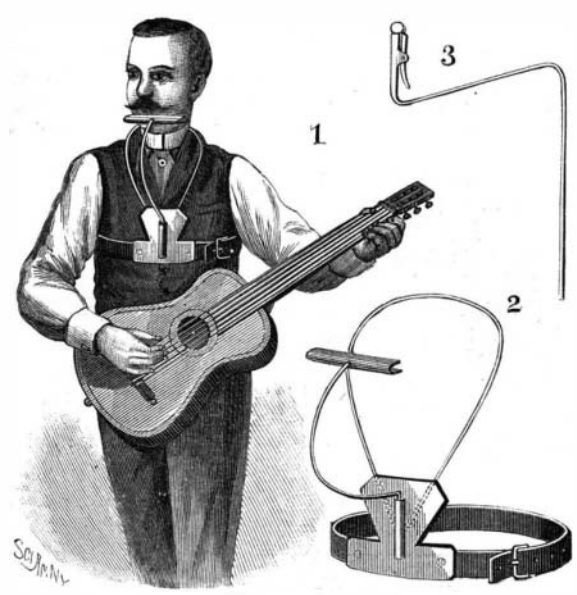
glass. Centrally to the rear of the sliding cover is attached a cord or chain, which extends downward in a transverse groove upon the fixed cover, and is secured at the other end to the rear of the sliding shelf, so that when the cover is drawn out the sliding cover is raised, and when the cover is closed the shelf is drawn in.

The Congressional Vacuum Balloon.

The committee of the House of Representatives on acoustics and ventilation has actually reported favorably a bill appropriating $75,000 to subsidize a man who thinks he can construct a steel "vacuum" balloon of great power. He is to be allowed to use the facilities of one of the navy yards for the building of his machine, and is to have the money as soon as he has expended $75,000 of private capital upon his air ship. One of the mathematical physicists of Washington was asked by a member of Congress whether such a balloon could be successfully floated. He set to work upon the problem, and here are some of his results, which are rather curious: A common balloon is filled with hydrogen gas, which, being lighter than air, causes the balloon to rise and take up a load with it. But, as the pressure of the gas within is equal to the pressure of the atmosphere without, no provision other than a moderately strong silk bag is required to prevent collapse. The inventor of the proposed steel balloon hopes to gain greater lifting power by using a vacuum instead of gas, the absence of substance of any kind being lighter than even hydrogen gas. But he has to contend with the tendency of the shell to collapse from the enormous pressure of the atmosphere on the outside, which would not be counterbalanced by anything inside of it. The first question which presented itself was, How thick could the metal of the shell be made, so that the buoyancy of the sphere, which would be the most economical and the strongest form in which it could be constructed, would just float it without lifting any load? The computations showed that the thickness of the metal might be 0·000055 of the radius of the shell. For example: if the spherical shell was 100 feet in diameter, the thickness of the metal composing it could not be more than one-thirtieth of an inch, provided it had no braces. If it was thicker, it would be too heavy to float. Now, if it had no tendency to buckle, which of course it would, the strength of the steel would have to be equivalent to a resistance of more than 130,000 pounds to the square inch to resist absolute crushing from the pressure of the air on a cross section of the metal. Steel of such high crushing strength is not ductile, and cannot be made into such a shell. If the balloon is to be braced inside, as the inventor suggests, just as much metal as would be used in constructing the braces would have to be subtracted from the thickness of that composing the shell. Of course, such a shell would buckle long before the thickness of the metal of which it was composed was reduced to 0·000055 of its radius. In other words, it is mathematically demonstrated that no steel vacuum balloon could be constructed which could raise even its own weight. This is an illustration of how intelligently Congress would be likely to legislate on scientific matters unguided by intelligent scientific advice.—*Science.*

AN IMPROVED HARMONICA HOLDER.

A holder in which a clamp or catch for a harmonica or similar instrument is mounted on a support, with means for attaching it to the body of the musician, is

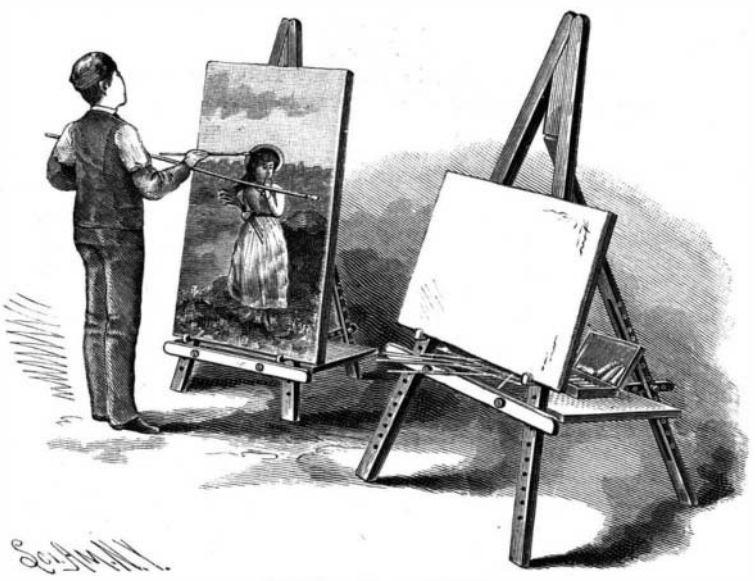


MULHOLLAN'S HARMONICA HOLDER.

illustrated herewith, and has been patented by Mr. William E. Mulhollan, of Portland, Oregon. The body of the holder consists of a nearly flat plate, adapted to rest against the person, with a bottom cross strip to which is attached a strap or retaining band for holding the plate against the body. An attached pear-shaped loop, as more fully shown in Fig. 2, is also adapted to be placed around the neck to sustain the plate, which has a projecting socket in front for the reception of a detachable bent shank, carrying on its outer end a catch or clamp for removably holding a harmonica or other mouth instrument, which is thus supported in convenient position for playing, leaving the hands free for another instrument. In Fig. 3 is shown another form of bent shank adapted to be placed in the socket for holding music in convenient position for reading when performing on a flute or similar instrument.

AN EASEL WITH ADJUSTABLE SHELF.

An easel having a detachable and adjustable shelf, adapted to receive colors, pallette, etc., or articles of bric-a-brac or other ornaments when the easel is employed to display a picture, is illustrated herewith, and has been patented by Mr. William H. Van Wart, of Stonington, Conn. The front legs of the easel are provided



VAN WART'S EASEL.

with a series of apertures, in which are entered suitable pins for the support of a canvas or picture to be exhibited, or these pins may hold a suitable narrow table for such purpose. A shelf which is more or less rectangular, and of a size adapted to that of the easel near its base, is supported in front by a clamp-like cross-piece, attached to the shelf by screws or thumbscrews, the rear leg of the easel supporting the shelf at the other side by means of a bar attached to the under side of the shelf, passing through a slot in the rear leg of the easel, the shelf being held at any desired height by a pin passed through one of a series of apertures. Such a shelf, while useful for holding artists' materials or articles for display, acts also as a brace, imparting both strength and steadiness to the easel. The shelf may be made in sections hinged together to be folded, for convenience in transportation or out-of-door work, with a stud to engage an aperture in the rear leg of the easel, and the forward corners of the shelf recessed where they engage and are supported in position upon the forward legs, by pins placed in apertures provided therefor.

Sugar Machinery.

The British Vice-Consul at St. Iago de Cuba, in a Foreign Office report, states that the sugar estate machinery in use in Cuba is obtained from England, the United States, and France. He says the English sugar mills are found to be the strongest and best, but the French evaporating apparatus is preferred to and found to work better than the English. The general class of machinery made in the United States for export is, in his opinion, unreliable, being simply made to sell, though that used in the American refineries is unrivaled. Small machinery is often ordered from the United States instead of from Europe, on account of the greater promptness with which delivery can be obtained. At present there are two appliances for use on sugar estates for which there should be a good future, viz., cane shredders and furnaces for burning green bagasse. Though there are several in the market, none has so far given universal satisfaction, and the report states that there is a field for really good articles of this kind.

A Great Globe.

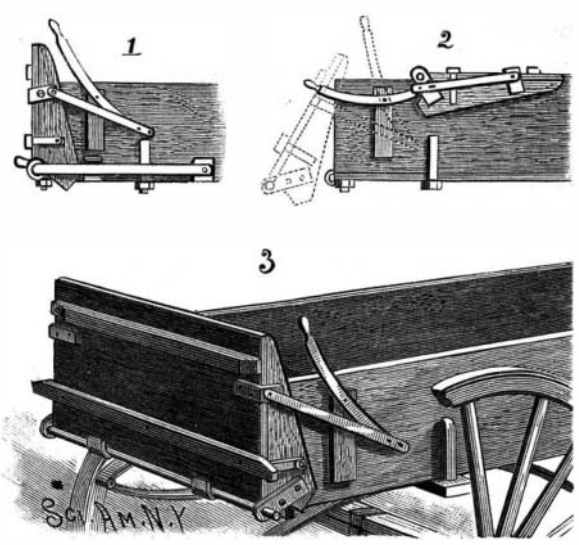
According to *La Nature*, an immense terrestrial globe, constructed on the scale of one millionth, will be shown at the Paris exhibition of 1889. A place will be set apart for it at the center of the Champ de Mars. The globe will measure nearly 13 meters in diameter, and will give some idea of real dimensions, since the conception of the meaning of a million is not beyond the powers of the human mind. Visitors to the exhibition will see for the first time on this globe the place really occupied by certain known spaces, such as those of great towns. Paris, for instance, will barely cover a square centimeter. The globe will turn on its axis, and thus represent the movement of rotation of the earth. The scheme was originated by MM. T. Villard and C. Cotard, and *La Nature* says that it has been placed under the patronage of several eminent French men of science.

Buckthorn in Toothache.

Dr. Gretchinsky has called attention to a practice which obtains among the peasantry in some parts of Southern Russia of treating toothache with a gargle of decoction of buckthorn—*Rhamnus catharticus* (*Lond. Medical Recorder*, June 20, p. 241). He states that, in order to test the ground of this practice, he made a series of control experiments upon a number of inmates of the local prison who were suffering from toothache. The patients were ordered to gargle their mouths with the cooled decoction every three or five minutes until the pain disappeared, and in every case the suffering ceased in about half an hour, though there still remained a vague aching or kind of itching about the teeth. A prolonged anodyne effect was produced by inserting a cotton wool plug steeped in the decoction in the cavity of a hollow tooth. Dr. Gretchinsky considers his experiments proved decoction of buckthorn to be a reliable means for mitigating such dental pain as depends upon inflammation of the pulp. He recommends the decoction to be made by boiling 100 parts of the bark in water sufficient to yield 200 parts of the strained liquid and adding 10 parts of brandy. Another writer attributes the anodyne action to the powerfully astringent properties of the decoction.

AN IMPROVED END GATE FOR WAGONS.

An end gate removably pivoted at its lower edge to a wagon body, and provided with levers, whereby it is moved in and out of position by a person in the wagon, has been patented by Mr. Emil L. Burklund, of Wahoo, Neb., and is illustrated herewith. It is formed with side parts braced by metallic strips, and overlapping the body, and is pivoted at the bottom by means of a rod passing through sleeves or loops on the wagon body, the lower ends of the side parts being curved, and resting upon strips secured to the rear edge of the body, whereby the gate may rock on its lower edge independent of the pivotal connection. The gate is operated and held in closed position by means of handled levers, each pivoted to a strip secured on the wagon body, the outer ends of these levers being each pivoted to one end of a bar, which at its other end is pivoted to a bracket projecting from the side edges of the end gate. The joint between the outer end of the handled lever and the bar is made adjustable, there being different holes in which the pivot pin may be placed, to secure greater range of movement of the end gate. When it is desired to use the end gate for dumping or unloading, the pivotal rod at the bottom is slipped out of the sleeves, when the gate may be thrown out at its lower end, as shown in dotted lines in Fig. 2, or it may be moved entirely out of the way, by means of the levers, and brought down upon the top of the wagon body, in position to serve as a seat, as also shown in the same figure. In Fig. 1 is shown another form of pivotal connection at the bottom of the end gate, for use where the location of the wheels would interfere with the ready removal of the pivotal rod. In the latter case, the end gate has a tubular rod secured by metallic eyes or bent strips to its lower edge, the ends of this rod being held by a catch block on the end of a metallic strip, secured along the



BURKLUND'S WAGON END GATE.

lower edge of the wagon body, there being a handle whereby, with this hinge connection, the lower edge of the end gate may be easily detached or engaged in hinged position.

A MAN who has tried it says that wooden posts treated as follows, at a cost of two cents apiece, will last so long that the party adopting it will not live to see his posts decay. Take boiled linseed oil, and stir in pulverized charcoal to the consistency of paint, and put a coat over the timber.