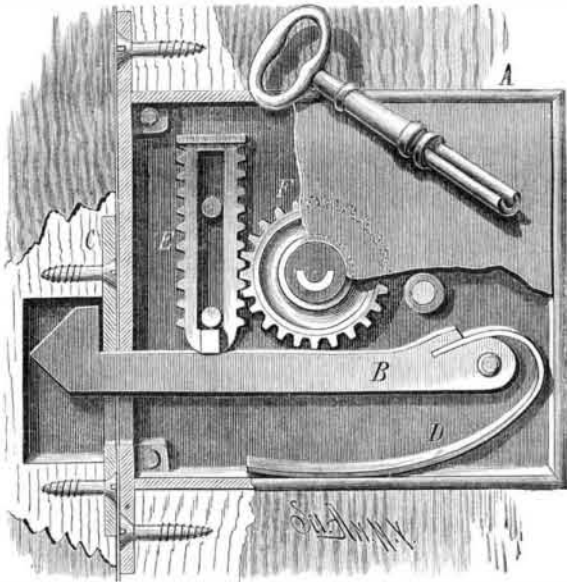


SPRING LOCK.

The simple spring lock herewith illustrated is the invention of Mr. Frank O. Phelps, of Blue Island Ill. One end of the bolt, B, is pivoted to the casing and the other end projects through a slot, being provided with a suitable catch to engage the face plate. The lower, rounded end of a double rack, E, slotted longitudinally to engage guide pins in the casing, bears on the bolt, whose free end is pressed upward by a spring, D, arranged as shown. Meshing with the teeth of the rack is a toothed wheel, F, whose hub is extended on each side and journaled in apertures in the casing. Extending through the hub is an irregular slot to receive the key,

**PHELPS' SPRING LOCK.**

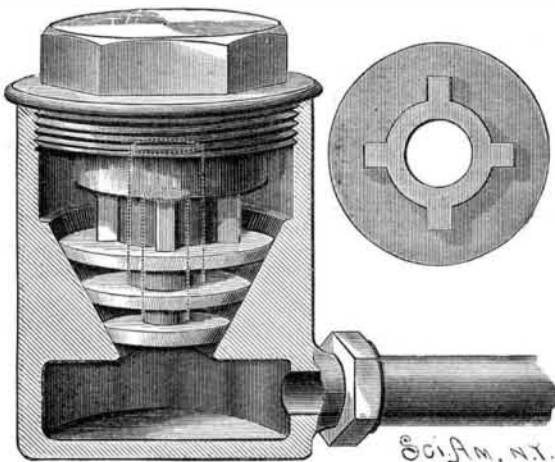
so that the lock can be operated from either side. Although here shown in a lock of the mortise pattern, this arrangement is equally applicable to many other styles. The key may be dispensed with, and handles used instead.

The key being inserted and turned causes the toothed wheel to carry forward the rack, and thereby drive the bolt back to an open position. Upon releasing the key, the lock springs back to a closed position.

LOCOMOTIVE BOILER CHECK VALVE.

The accompanying engraving represents a check valve adapted to stop the back pressure of steam or fluids, but particularly useful in feeding steam boilers when injectors or inspirators are used. The engraving shows the invention in the shape of a boiler check with the inlet pipe near the bottom, the outlet being near the top and at right angles with the inlet. The shape of the body or case of the valve is clearly shown. In the top is fitted a screw cap which gives access to the interior. About at the center, the wall of the chamber is made tapering, preferably at an angle of about 35 deg., to form a seat upon which the three check disks of the valve. The bored step of the upper disk is provided with longitudinally ranging exterior ribs, which fit within a bore of the cap and guide the disks in the cap. The bored stem of the middle disk fits in the bore of the stem of the upper one, and the solid stem of the lower disk fits in the bore of the stem of the middle one.

When water, steam, or other fluid is admitted at the inlet, the lower disk will open about one-eighth of an

**GLACE'S LOCOMOTIVE BOILER CHECK VALVE.**

inch, and then will strike the next disk and raise it to a like distance to the upper disk, which will then open for any required distance to pass the fluid to the outlet, whence it escapes. When the feed is shut off, the back pressure will be held by the upper disk closing, when the other disks will seat themselves by gravity. Should the upper disk happen to be held from a tight closure by dirt or other matter, the middle disk would tightly close the valve; and should that be prevented from seating perfectly, there would be another chance of a tight closure of the valve by the perfect seating of the bottom disk; consequently, a practically perfect clos-

ure of this check valve may at all times be depended upon. This construction not only makes the valve more reliable, but it adds most materially to its durability by preventing the wear that takes place when a fluid passes through an imperfectly seated valve. One of the valves has been working upon a locomotive for some time, and it is now in as good condition as when first applied; this leads to the belief that these valves will work for an indefinite period without requiring any attention whatever.

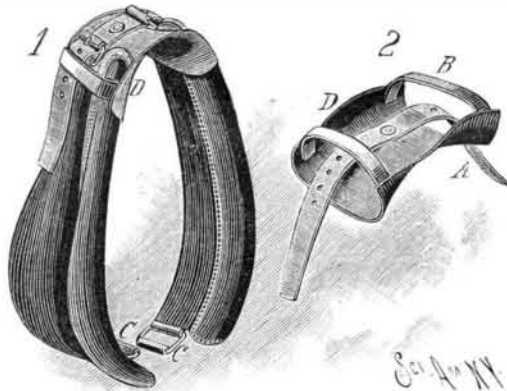
This invention has been patented by Mr. A. D. Glace, of Rocklin, Cal.

Volcanic Ejections.

The quantity of matter ejected by the New Zealand volcanoes lately is probably very great. The Melbourne *Argus* of June 29 writes: "Latest accounts as to the New Zealand volcanic convulsions state that an area of 2,000 square miles is said to be covered with 3 in. and more of dust. About 20 miles square is covered mostly to the depth of 3 ft. and more. For 400 square miles at the outside the country is totally destroyed, and 1,600 square miles is much damaged, the result depending on the problem of the fertilizing qualities of the deposit." Although 20 miles square is here mentioned, 20 square miles is probably more nearly the area covered 3 ft. in depth with the ejecta. Even that quantity represents about 1,400 millions of cubic feet, which will allow a good deal of contraction of the earth to take place, but the estimate is probably too much; but in any case the amount extruded here and by Krakatoa must make room for a good deal of secular cooling and contraction.

HORSE COLLAR.

The accompanying cut represents an improved horse collar, which has been patented by Mr. Patrick Sheehan, of Monroe, Wis. The collar is formed of two similar parts, having pads like those ordinarily employed, and provided with rolls forming, together with the pads, grooves for receiving the hames. The neck shield, D, is placed under the upper ends of the collar, and provided with straps, B, and the longitudinal strap, A, riveted to the center of the neck shield and

**SHEEHAN'S HORSE COLLAR.**

received in buckles secured to the upper ends of the halves of the collar. The hames are provided with straps which extend through the rectangular loops, C, attached to the lower ends of the pads, and are buckled together. Arranged in this way, the collar may be expanded or contracted to fit horses of different sizes. The lower ends of the halves of the collar being disconnected are free to move independently and in accordance with the motion of the horse's shoulders. The shield permits of adjusting the collar for different horses, and the great flexibility of the collar insures a perfect fit.

A New Discovery of Natural Gas in Michigan.

Another natural gas field has been recently discovered, and partially developed, at the foot of Lake Huron, within the precincts of the city of Port Huron. Mr. Charles Bailey, while "boring for oil" in June last, struck an immense flow of gas, at a depth of little more than five hundred feet; and two wells sunk subsequently give like results, exhibiting a pressure of 180 pounds to the square inch. This would appear to afford the one solution necessary to the manufacture of salt in this region, viz., cheap fuel. A magnificent vein of rock salt, several feet in depth, is known to underlie the whole region between Lake St. Clair and Lake Huron, extending west and north to the Saginaw and Muskegon, at a depth varying from 800 to 1,600 feet; in the northern counties, along Saginaw Bay, this is utilized in the form of brine, and also at Marine City, on the St. Clair River.

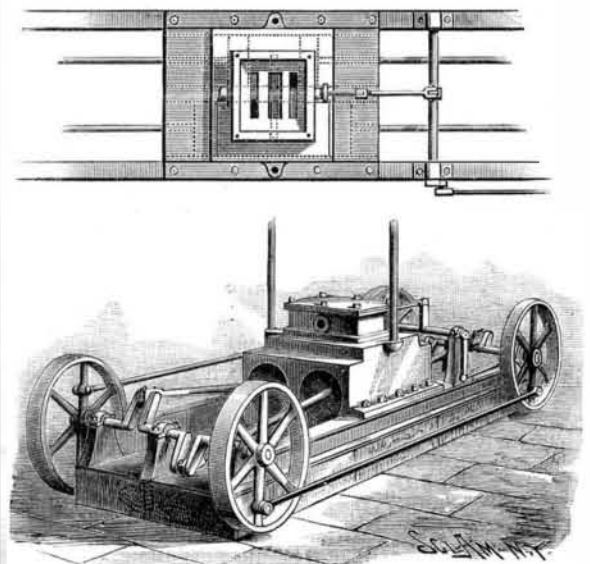
Though a new find, gas is not wholly unknown to the region, having frequently been found at depths varying from 80 to 150 feet, but never in definite quantities. A well on the stock farm of Hon. John P. Sanborn was abandoned some years since because of its eruptions of gas; a similar well on the dairy farm of Mr. George Tawse, adjoining, has been utilized for years as a means of light and fuel.

While the wells have decisively proved that oil can

be had in this region in paying quantities, the gas settles a more pertinent question, and is deemed the more valuable. Steps have already been taken to furnish the gas to residents of Port Huron, for both fuel and light. The facilities for shipment by either water or rail, at Port Huron, leave little doubt that valuable manufacturing interests will be added to the region, in view of this new and remarkable development of natural fuel.

STEAM ENGINE.

To the center of the frame is fastened a casting, provided with cylinders, placed alongside of each other,

**RUSH'S STEAM ENGINE.**

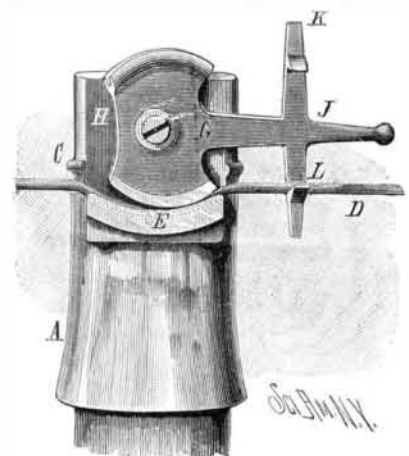
and each having two pistons. Each pair of pistons is connected by pitmen with crank arms, on a shaft mounted in bearings on the end of the frame. The shafts are provided with additional crank arms or pulleys, which are connected with each other by rods. The steam chest is placed centrally on top of the casting; the arrangement of the ports is clearly shown in the upper view. A common slide valve is operated from one of the shafts in the usual manner.

When the engine is in operation, the pistons in one cylinder recede from each other, while those in the other cylinder advance toward each other, by means of the relative positions of the pitmen and their respective crank shafts. One slide valve controls the admission and exhaust of steam from both of the cylinders, thereby lessening the number of parts in the engine and increasing the efficiency, when compared with similarly arranged engines having each cylinder provided with a separate steam chest.

This invention has been patented by Mr. Peter S. Rush, of Atlanta, Texas.

INSULATOR FOR ELECTRIC WIRES.

One side of the insulator is cut away and provided with a concave laterally projecting lip, having a transverse groove adapted to receive the wire. To the plane face of the insulator is pivoted a lever, formed with two oppositely arranged cam segments, having grooves in their peripheries to receive the wire. The lever is provided with an arm having a cross arm, made with hooks on its ends. The wire is placed in the concave lip when the arm is in a vertical position, and the wire is clamped between one of the

**LEONARDSON'S INSULATOR FOR ELECTRIC WIRES.**

cams and the concave lip, by turning the arm into a horizontal position, when the arm is held by the hook being brought into engagement with the wire. With this construction, the wires may be readily strung and securely fastened; and when it is desirable to remove them, they may be readily disengaged by releasing the lever and turning it to a vertical position. The body of the insulator has a circumferential groove, which permits of applying the usual binding wire, if desirable.

This invention has been patented by Mr. John M. Leonardson, of Ludington, Michigan.