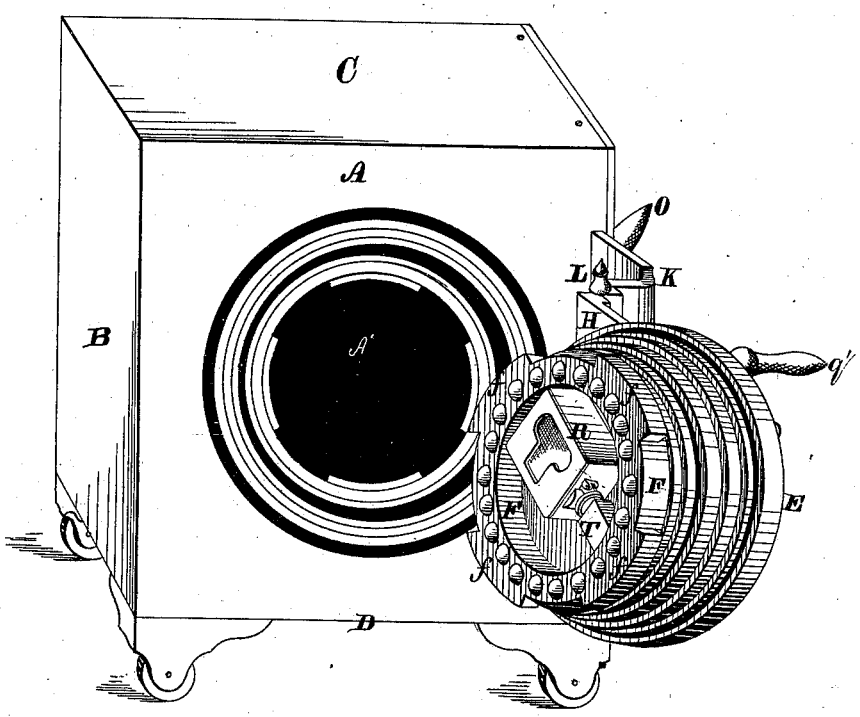
4 Sheets—Sheet 1.

D. O. PAIGE.

Burglar-Proof Safe.

No. 199,567. Patented Jan. 22, 1878.

Fig. 1.



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4 Sheets—Sheet 2.

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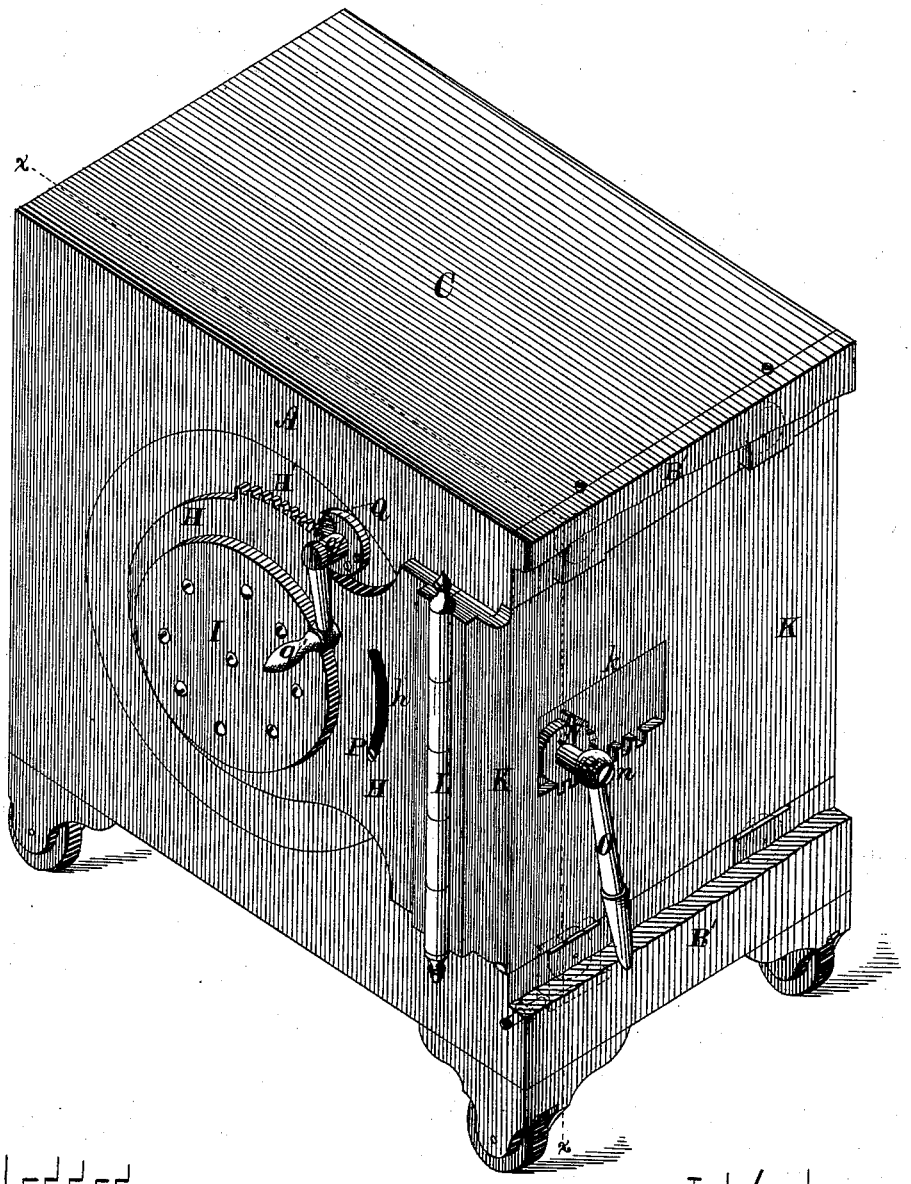
Fig. 2.



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4 Sheets—Sheet 3.

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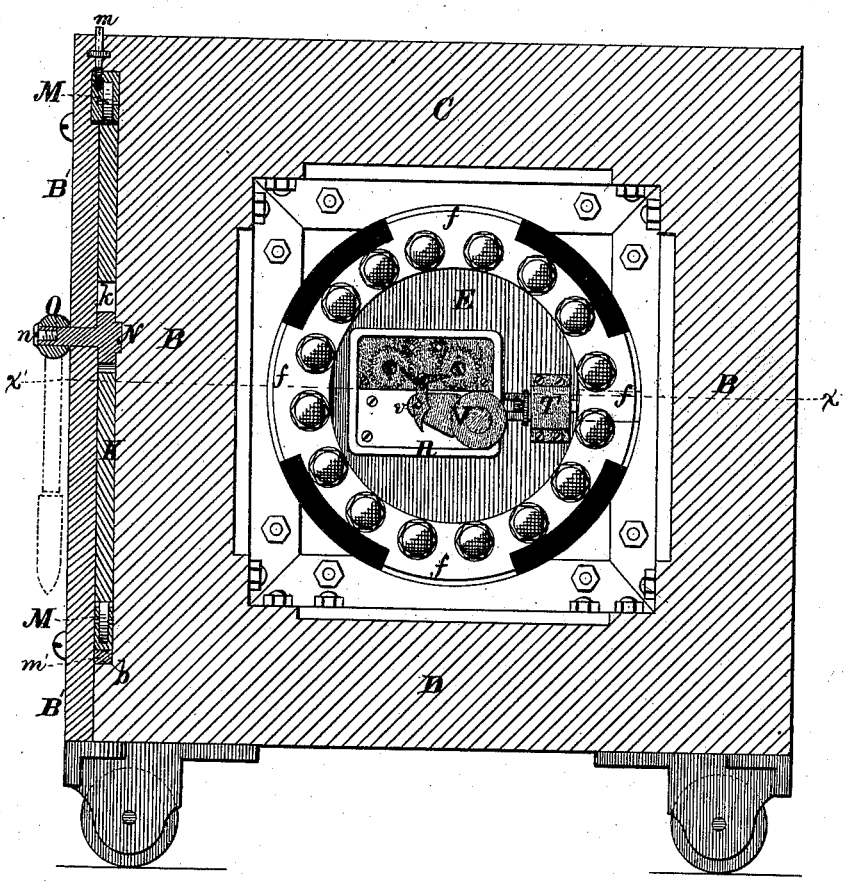
Fig. 3.



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4 Sheets—Sheet 4.

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Fig. 4.

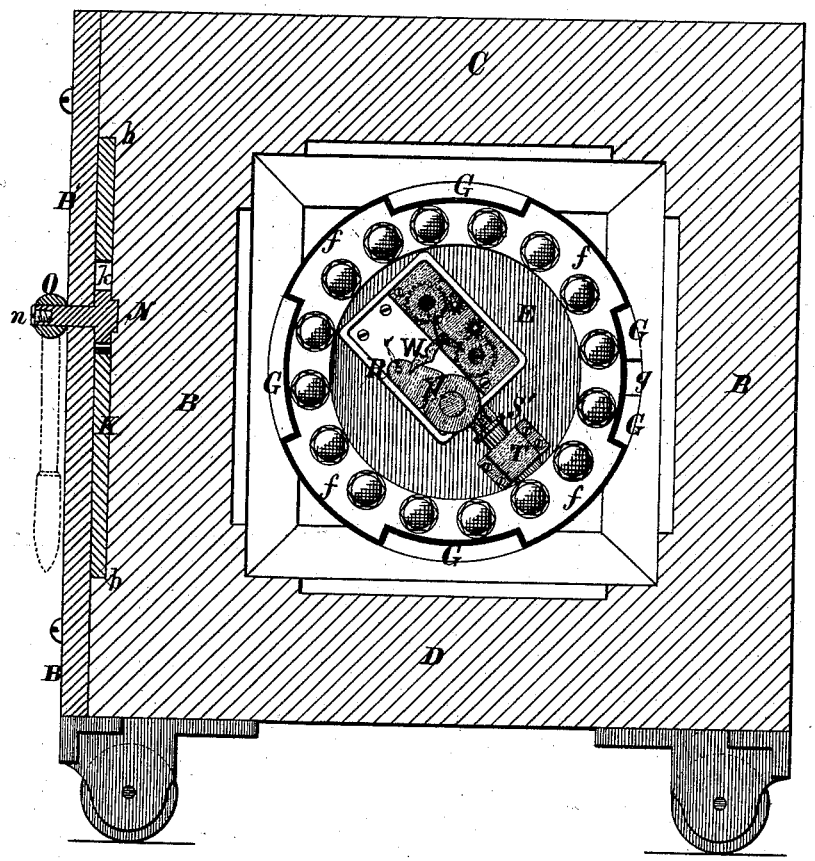
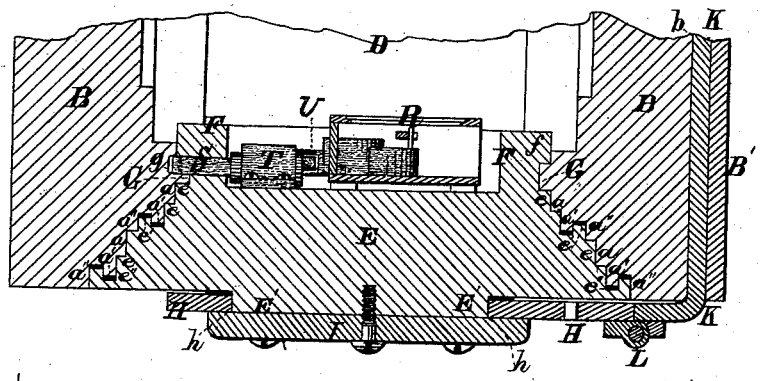


Fig. 5.



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UNITED STATES PATENT OFFICE.

DAVID O. PAIGE, OF DETROIT, MICHIGAN, ASSIGNOR TO DETROIT SAFE COMPANY.

IMPROVEMENT IN BURGLAR-PROOF SAFES.

Specification forming part of Letters Patent No. **199,567**, dated January 22, 1878; application filed January 29, 1877.

To all whom it may concern:

Be it known that I, DAVID O. PAIGE, of Detroit, in the county of Wayne, and in the State of Michigan, have invented certain new and useful Improvements in Safes; and do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawing, making a part of this specification, in which—

Figure 1 is a perspective view of my improved safe with its door opened. Fig. 2 is a like view of the same with its door closed, a portion of the covering-plate being removed from over the hinged carrier, so as to show the mechanism employed for operating the latter. Figs. 3 and 4 are vertical sections of said safe upon line *x x* of Fig. 2, and, respectively, show, in rear elevation, said door in the positions occupied when locked and unlocked; and Fig. 5 is a horizontal section of the front of said safe, upon line *x' x'* of Fig. 3.

Letters of like name and kind refer to like parts in each of the figures.

In the construction of a burglar-proof safe it is of vital importance that no openings, however small, should be left between the edges of its door and the door-jamb; and, further, that the mechanism employed for securing said door in position, when closed, should be capable of manipulation without weakening any portion of the door or the walls of the safe, by passing through the same a spindle or other means for operating said locking appliances.

The first-named object is in part secured by making the door and its opening circular, so as to permit of the fitting of their abutting surfaces by or within a lathe, and afterward grinding said surfaces with emery or other like abrasive material; but, in order that such a door may answer the desired purpose, it is necessary that, when closed, a considerable inward pressure be brought to bear, so as to firmly shut it before the operation of locking is performed, which pressure and its consequent friction is sufficient to prevent the operation of any ordinary locking mechanism.

To obviate these objections and render a safe proof against the introduction of gases or other explosives, and incapable of being opened by wedges or other similar mechanical means, is the design of my invention, which consists, principally, in a safe in which are combined the following-named elements, viz: a round door, which, when seated, may be locked within its opening by a partial rotation upon its axis; a spring-bolt for preventing the unlocking of said door by rotation; and time mechanism by which said spring-bolt may be withdrawn at any determined hour, substantially as hereinafter specified.

It consists, further, in combining with the door of a safe a carrier for sustaining, seating, and unseating said door, and made vertically adjustable upon, or with reference to, said safe, substantially as and for the purpose hereinafter shown and described.

It consists, further, in combining with a circular pivoted safe-door a toothed segment formed upon the carrier, to which said door is pivoted, and a pinion journaled upon said door, and engaging with said segment, by means of which said door may be rotated upon its axis, substantially as is hereinafter specified.

It consists, further, in the means employed for moving the hinge-carrier toward or from the front of the safe, substantially as and for the purpose hereinafter shown and described.

It consists, further, in the construction of the hinge-carrier and its combination with the walls of the safe, substantially as and for the purpose hereinafter specified.

In the annexed drawings, A represents the front wall, B the side walls, C the top, and D the bottom, of a safe, which may be of any desired size and construction.

Within the front wall A is provided a circular opening, A', which has a general conical form, and decreases in size from front to rear, and within its edges is provided with a series of steps or rabbets, *a*, tongues *a'*, and grooves *a''*, which have any desired relative arrangement, the open sides of said grooves being toward the front of the safe.

Fitted to or within the opening A' is a door, E, which corresponds thereto in size and shape, and at its periphery is provided with rabbets *e*, tongues *e'*, and grooves *e''*, that con-

form to, but are the reverse in arrangement of, those provided in the opening A′, and, when said door is closed, fit closely over, against or within the correspondingly-shaped parts which compose the surface of the edge of said opening.

The periphery of the door E and the jamb or edge of the doorway A′ are fitted within a lathe, so as to be mechanically true, after which the former is placed within the latter, and their bearing-faces ground together with emery or other like abrasive material, so as to form between the edges of said door and door-jamb a gas and air tight joint.

The grooves *a″* and *e″* are made deeper than the tongues *a′* and *e′* which fit therein, and within the bottom of each is placed a packing of felt, rubber, or other easily-compressible elastic material, which packings receive the front faces of said tongues and aid in cutting off communication between the exterior and interior of the safe through the doorway.

Upon the inner face of the door E is secured an annular plate or ring, F, which extends inward somewhat beyond the inner face of the front wall A of the safe, and upon its periphery, immediately in rear of its inner end, are provided a number of radial lugs, *f*, that are placed at equidistant points around said plate, with corresponding spaces between their adjacent ends, and upon their outer or front faces incline outward from end to end.

The inner portion of the opening A′ is provided with a series of radially inward-projecting lugs, G, which correspond in size and relative arrangement to the like features of the lugs *f*, and are separated by spaces, through which the latter may pass when the door E is moved inward.

The rear or inner face of each lug G is inclined in the same direction as the front faces of the lugs *f*, so that if the door E is shut and then rotated in the right direction said lugs *f* will be moved in rear of said lugs G, with their inclined faces in contact, and, by means of such inclination of said bearing-faces, said door will be drawn firmly inward against its seat and, at the same time, locked in place and rendered incapable of outward motion without breaking said locking-lugs.

In consequence of the shape of the edges of the doorway A′ and door E, it is necessary that the latter should be moved in a direct line toward or from the former, in order that the tongues and grooves, which fit closely together, may be engaged with or be disengaged from each other. It is also necessary that suitable provision be made for the partial rotation of said door upon its axis, as the ordinary form of hinge for suspending doors will not answer the required purpose.

In order to effect the result named the door E is provided upon its outer face with a circular boss or plate, E′, which fits into a corresponding opening, *h*, that is provided, in and through a plate, H, and is secured therein while permitted to turn freely, by means of a plate or cover, I, which is fastened upon the outer face of said boss E′, and extends over the face of said plate H, adjacent to said opening *h*.

The plate or carrier H is connected at one edge to or with a plate, K, by means of a hinge, L, while said plate K fits into a corresponding recess, *b*, that is formed within the outer face of one of the side walls B, and is inclosed, except at the front, where said plate K enters, by means of a plate, B′, which is fastened to or upon said side wall, the arrangement being such as to enable said plate or carrier K to be moved into or drawn out from said recess, so as to move the door E toward or from the doorway A′.

For convenience, the front end of the hinge-carrier K is bent toward the doorway A′, and, when the door E is closed, rests against the front wall A, the hinge L being thus placed sufficiently distant from the outer face of the covering-plate B′ to enable said door to be opened should the safe be placed in a corner with said plate against a wall.

The upper and lower edges of the hinged carrier K rest upon or bear against friction-rollers M, each of which is made adjustable vertically by means of a screw, *m*, a wedge, *m′*, or a wedge moved by a screw, for the purpose of regulating the vertical position of said carrier and compensating for the wear of parts, so as thereby to enable the door E to be moved squarely into its opening.

In order that the carrier K may be moved longitudinally within its bearing, a rectangular opening, *k*, toothed upon its lower edge, is provided near the front side, at the vertical center of said carrier, and within said opening is placed a toothed pinion, N, which engages with the teeth of said opening, and is secured to or upon a shaft, *n*, that is journaled within the wall B and covering-plate B′.

Upon the outer end of the shaft *n* is secured a lever, O, by means of which said shaft and the pinion N are rotated and the carrier K moved forward or to the rear. The axial movement of the door E is limited by a stud, P, which is secured within the outer face of said door and projects outward into a slot, *h′*, that is provided within the carrier H, and is concentric with the axis of said door. When the latter is rotated until said stud reaches the upper end of said slot, said door is in position to be opened or closed, but when closed and turned until said stud reaches the lower end of said slot, said door is fastened within the doorway by the engagement of the inclined locking-lugs.

The semi-rotation of the door E is effected by the following-described means: A toothed segment or rack, H′, is secured to or formed upon the upper edge of the door-carrier H, concentric with the axis of the door E, and upon the face of said door, above said rack, is journaled a pinion, Q, which engages with

the latter. A crank, q', secured to or upon the outer end of the shaft q of said pinion, enables the latter to be rotated and caused to travel the length of said rack, and carry with it, in the same direction, the said door, to which it is attached.

When the door is closed and turned until the locking-lugs upon its inner face have engaged with the lugs upon the door-jamb, it is only necessary that said door should be prevented from moving upon its axis to render the safe at such point proof against the efforts of burglars. To secure such result without forming an opening through the door or through the wall of the safe I attach to or upon the inner face of said door a time-lock, R, which is of usual construction, except in so far as it has been necessary to change the bolt and its attachments, as is hereinafter described.

A bolt-carrier, S′, is constructed with a housing, T, which is secured to or upon the inner face of the door E, between the front end of the casing of the lock R and the ring F. The outer end of the bolt S is contained within a corresponding opening, that is provided in and through said ring. Upon the rear end of the bolt-carrier S′ is pivoted one end of a bar, U, which from thence extends through the casing of the time-lock, and has its opposite end pivoted upon the rear face near the upper side of a tumbler, V, which latter is pivoted within said casing, and at its rear side is provided with an arm, v, that has considerable weight. If, now, the arm v is turned downward against the lower side of the lock-casing the bolt-carrier S′ will be retracted to its farthest limit, while by raising said arm v said bolt-carrier will be thrown outward to its farthest limit in such direction. The arm v is provided upon its rear face with a stud, v', which, when said arm is raised to its farthest limit, engages with a spring-detent, W, that locks said arm in such position until the hour fixed for releasing the locking-bolt and opening the safe, when said detent is withdrawn from engagement with said stud v' by the time mechanism, and said arm v drops to its normal position. The outer end of the bolt S engages with a suitable recess, g, that is formed within one of the lugs G, at a point directly opposite to said bolt, when the door has been rotated until its lugs f are in full engagement with said lugs G, by which engagement of said bolt said door is prevented from motion upon its axis.

In order that the engagement of the bolt S may be effected by the rotation of the door it is necessary that the former should be capable of yielding longitudinally, so as to enable it to pass over the solid portion of the lug G, and then move outward into its recess g, when said door has reached the forward limit of its motion.

The outer end of the bolt is beveled in such manner as to cause said bolt to be forced inward by contact with the solid portion of the said lug G as said door revolves, but upon reaching the recess g within said lug said bolt will be forced outward into said recess and securely lock said door in place.

To lock the door, the time mechanism is started and set, and the arm v raised and caused to engage with the detent W, after which said door is closed and rotated in the usual manner until its lugs f are engaged with the lugs G, when the bolt S will enter the recess g, and secure said door in place until the hour arrives for which the time mechanism was set, when, by the releasing of said arm v, said bolt will be withdrawn and all obstacle removed to the re-opening of said door.

Should it happen that the bolt S does not pass freely into the recess g, some back pressure may be thrown upon the tumbler V, and the freedom of motion of the time mechanism interfered with at the moment when the arm v is to be released, the possible result being the stoppage of said mechanism, so as to prevent the safe from being opened.

To guard against such possibility, the lug at the rear end of the bolt-carrier S′ bears against the periphery of the tumbler V, when the arm v is raised to throw the bolt outward, and relieves the bar U from all pressure, the pivot-opening at the rear end of said bar being lengthened in a forward direction, so as to permit the latter to move rearward sufficiently to seat said lug upon said tumbler before said opening engages with and moves its pivot.

If desired, the spring-bolt may be omitted, and a spring-detent employed in place of the recess for receiving the end of said bolt.

I am aware that the rotation of a circular safe-door by means of a pinion pivoted upon a fixed support and engaging with a gear-wheel attached to the door has before been accomplished.

Having thus fully set forth the nature and merits of my invention, what I claim as new is—

1. A safe in which are combined the following-named elements, viz: a round door, which, when seated, may be locked within its opening by a partial rotation upon its axis, a spring-bolt for preventing the unlocking of said door by rotation, and time mechanism by which said spring-bolt may be withdrawn at any determined hour, substantially as specified.

2. In combination with the carrier K for sustaining, seating, and unseating the door E, the friction-rollers M, which form bearings for said carrier, and are adjustable vertically, substantially as and for the purpose set forth.

3. In combination with a circular pivoted safe-door, a toothed segment formed upon the carrier to which said door is pivoted, and a pinion journaled upon said door and engaging with said segment, substantially as and for the purpose specified.

4. In combination with the hinge-carrier K, arranged to move longitudinally within the recess b, and provided with the opening k,

which is toothed upon its lower edge, the pinion N journaled within said opening, and arranged to engage with the teeth of the same, substantially as and for the purpose shown and described.

5. The means employed for sustaining the hinge L and rendering the same adjustable toward or from the front wall of the safe, consisting of the carrier K secured to or upon said hinge, fitted within the recess *b* in the outer side of the side wall of said safe, and capable of longitudinal motion within said recess, substantially as specified.

In testimony that I claim the foregoing I have hereunto set my hand this 18th day of January, 1877.

D. O. PAIGE.

Witnesses:
GEO. S. PRINDLE,
JOHN W. PILLING.