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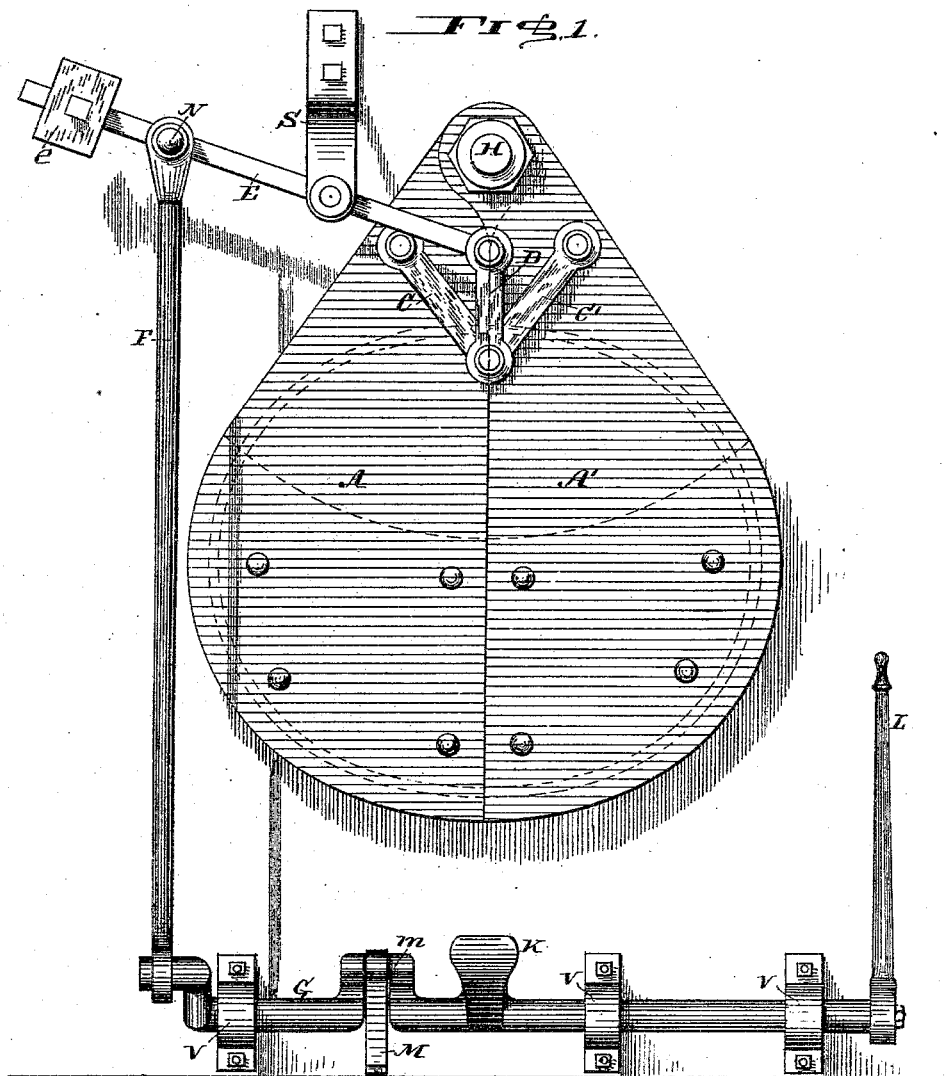
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H. I. BEARUP.

FURNACE DOOR.

No. 303,257.

Patented Aug. 12, 1884.



WITNESSES  
M. V. Rague  
Andrew H. Bearup

INVENTOR  
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(No Model.)

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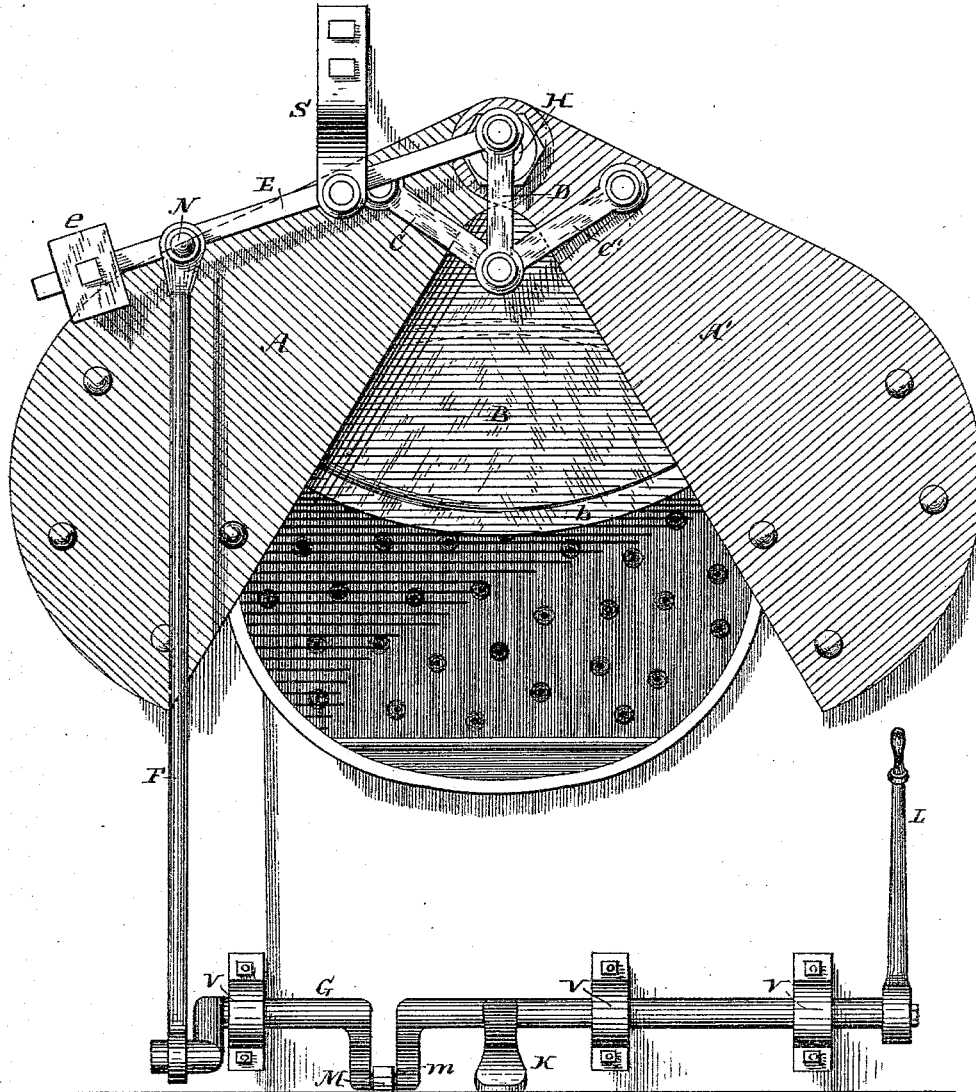
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Fig. 2.



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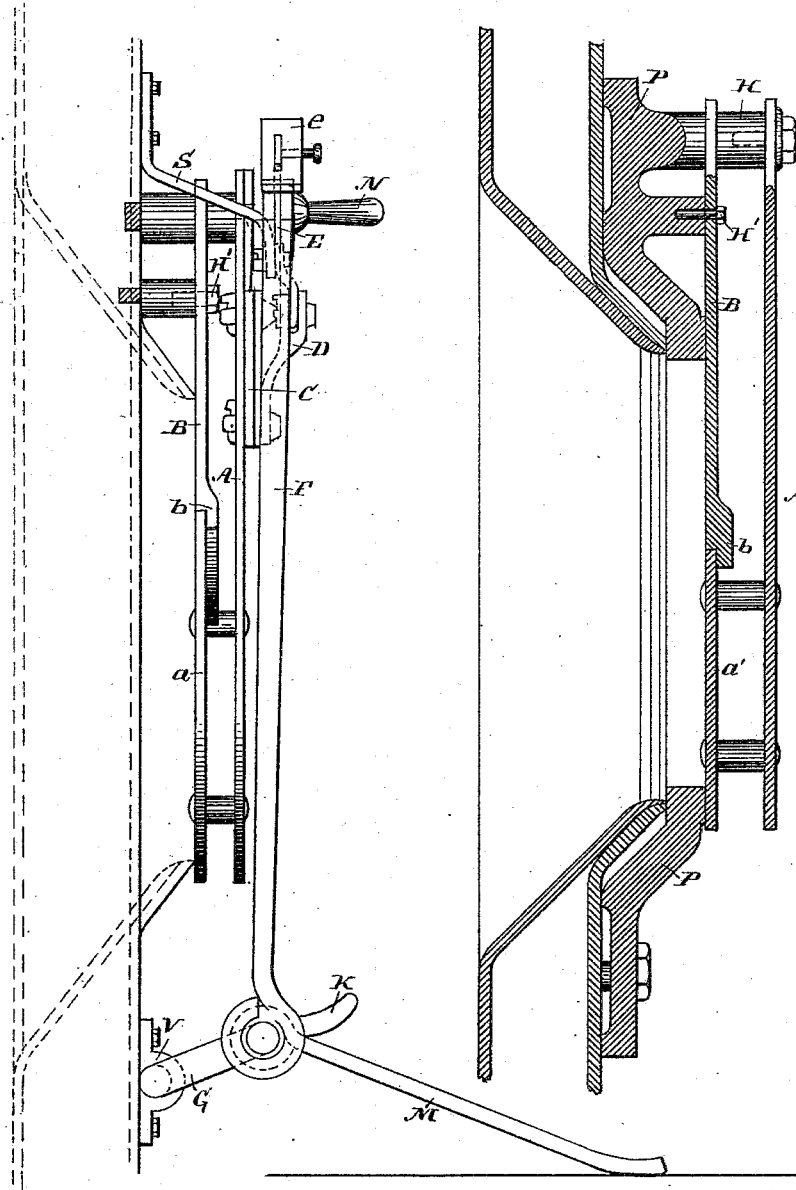
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Fig. 3.

Fig. 4.



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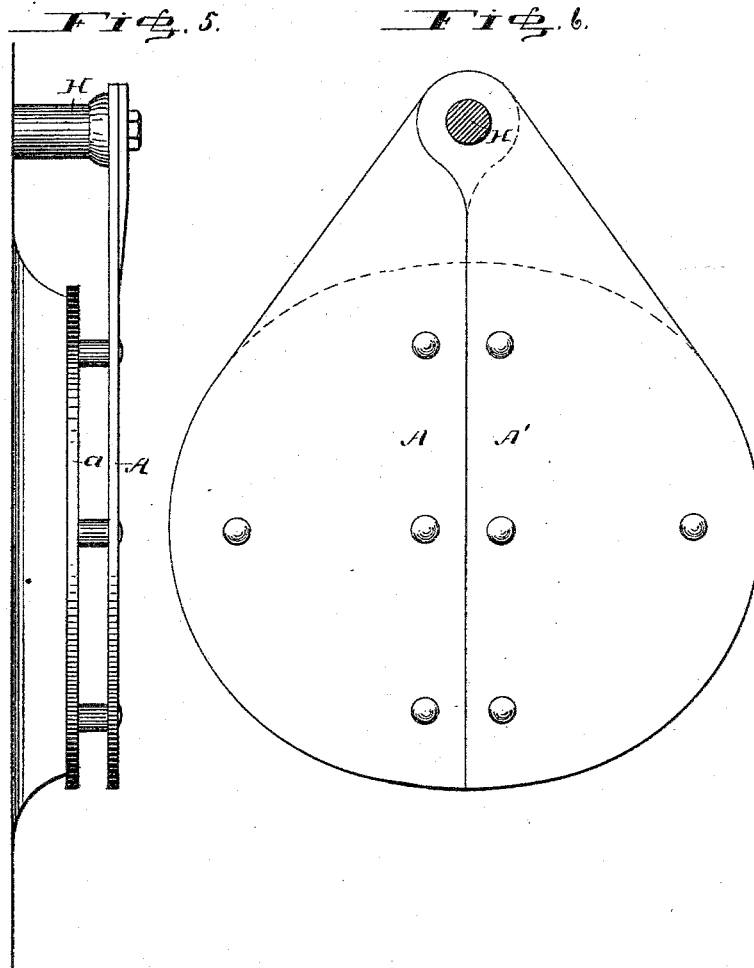
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(No Model.)

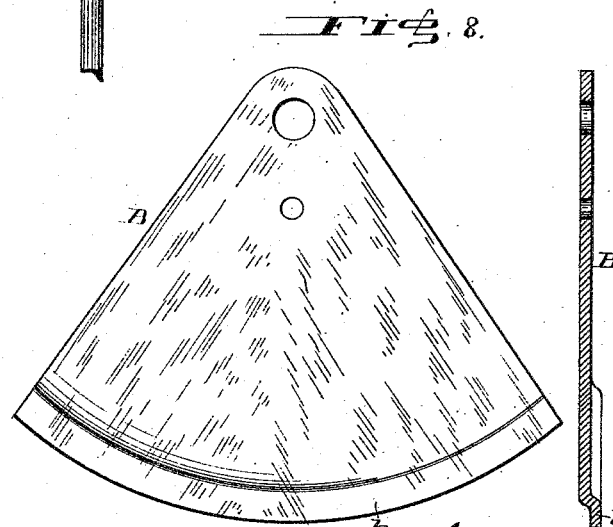
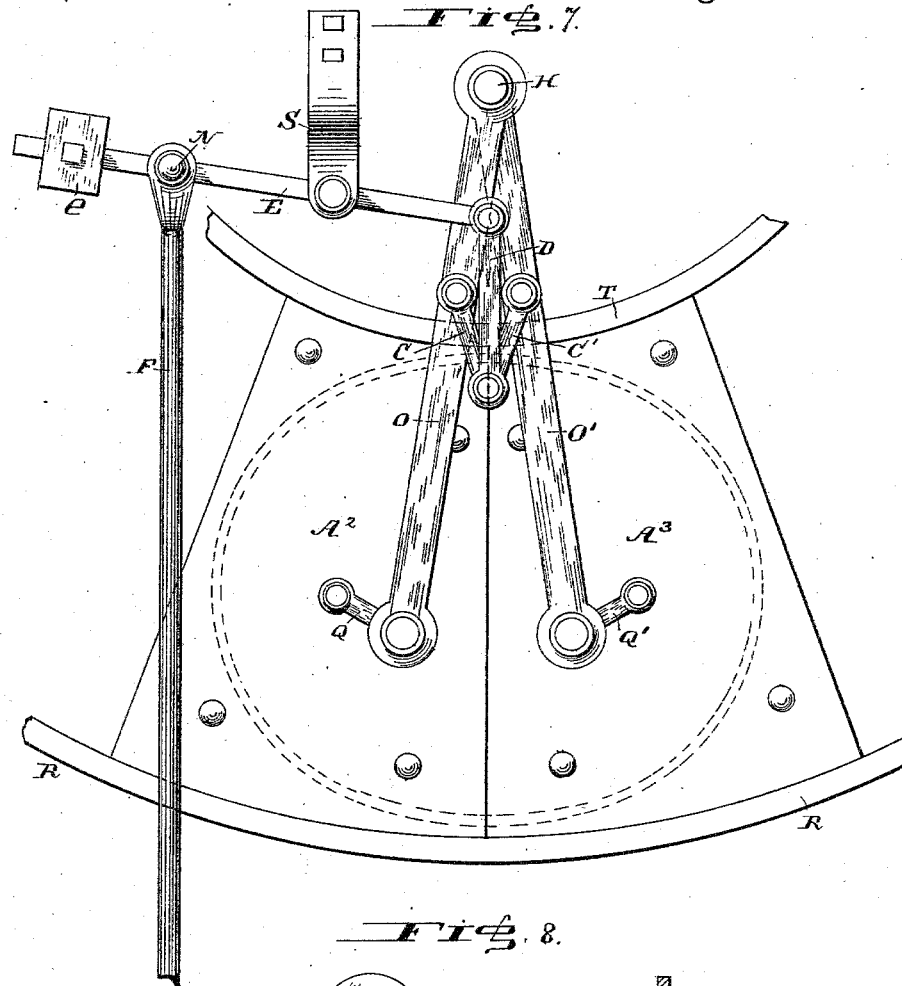
5 Sheets—Sheet 5.

H. I. BEARUP.

FURNACE DOOR.

No. 303,257.

Patented Aug. 12, 1884.



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# UNITED STATES PATENT OFFICE.

HENRY I. BEARUP, OF ELKHART, INDIANA, ASSIGNOR OF ONE-HALF TO  
WESLEY SMITH, OF ADRIAN, MICHIGAN.

## FURNACE-DOOR.

SPECIFICATION forming part of Letters Patent No. 303,257, dated August 12, 1884.

Application filed December 26, 1883. (No model.)

*To all whom it may concern:*

Be it known that I, HENRY I. BEARUP, a citizen of the United States, residing at Elkhart, in the county of Elkhart and State of Indiana, have invented certain new and useful Improvements in Furnace-Doors; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

The object of my invention is to provide a furnace-door for use on locomotives, boilers of marine engines, and in connection with furnaces of all descriptions, which can be easily and quickly opened and closed without requiring the fireman to use his hands, and which can, however, also be opened by hand; and my invention consists of a furnace-door which the fireman can open with his foot by stepping upon a lever, platform, or other suitable appliance, and which will close itself when the weight of the fireman is removed.

It further consists of a furnace-door, as hereinafter described, and also of mechanism for opening it, either by foot or hand, that is simple and cheap in its construction and operation, which occupies no more space when open than it does when it is closed, which will open and close with a short movement of the operating device and with a light pressure, and which will admit as little cold air as possible to the furnace when open.

In the present case I show and describe an improved furnace-door formed of two sector-shaped sections which are hung on a common pivot and a system of toggle-joint links, weighted lever, and connecting-rod that connects with a rock-shaft on or near the floor, which rock-shaft has a foot-lever arranged in a convenient position near the furnace-door, so that the fireman, by stepping with one foot on the foot-lever, causes the two wings constituting the halves of a double door to swing apart, and when the fireman removes his foot they fall together again, thus closing the door; but other arrangements of doors and operating devices may be devised without departing

from the main part of my invention, the essential feature of which is a furnace-door that can be opened by the fireman with his foot or hand, and which will automatically close itself, and I therefore illustrate hereinafter one of the many modifications of my invention that may be devised.

In the accompanying drawings, Figure 1 is a front elevation of a furnace-door which embodies my invention, the door being closed. Fig. 2 is a similar view with the door open. Fig. 3 is a side elevation of the door and operating mechanism when closed. Fig. 4 is a vertical section through the door and door-opening, (the operating mechanism being omitted,) showing the door attached to a cast-iron frame instead of being attached directly to the furnace or boiler. Figs. 5 and 6 are side and front views, respectively, of a slightly-modified door. Fig. 7 is a front elevation of a modification, showing a door arranged to slide in guides instead of to swing from a pivot above; and Fig. 8 is a front view and vertical cross-section of the apron B.

The doors A A' are preferably made double with outer plates of the shape shown in Figs. 1, 2, and 6, which are suspended from a common pivot, H, and with inner plates, a a', of the shape and size of the fire-door opening. Between the inner and outer plates there is an air-space to keep them cool and prevent them from warping. When the inner plates are burned out, they can be easily replaced by new ones. I cover up the upper portion of the door-opening with an apron-plate, B, which may be rigidly attached to the front of the furnace, a sufficient opening being left beneath it to allow for shoveling in coal. The apron is hung on the pivot H and held in position by the bolt H', and by removing the latter bolt it can be swung to one side out of the way when it is desired to gain access to the interior of the fire-box. The lower edge of the apron is an arc of a circle about the pivot H, and it has the projecting flange b, which laps over the top edges of the inner door-plates, a a', and forms a guide for the same, besides making a close joint.

The operating mechanism consists of the links CC', pivoted each at one end, respectively,

to the two wings of the door; the connecting-link D, which connects the free ends of the links C C' with the lever E; the lever E, fulcrumed on a hanger, S, attached to the furnace; and a rod, F, which connects the lever E with the crank of a rock-shaft, G, which shaft may be supported by bearings V on the front of the furnace, or which may be arranged on or beneath the floor or deck in front of the furnace. The rock-shaft G has a pedal, K, and it may also have an inclined foot-piece, M, one end of which rests on a double crank, *m*, of the rock-shaft and the other on the floor or deck. A handle, N, is attached to the bolt-coupling, the rod F to the lever E for convenience in opening the doors by hand, and I may also add a hand-lever, L, at one end of the rock-shaft or at any convenient point. The lever E has an adjustable weight, *e*, which counterbalances the weight of the door and the operating mechanism, the fireman adjusting it to the amount of pressure he desires to exert.

In Fig. 4 a cast-iron frame, P, is shown, which is bolted to the furnace, and which carries the doors and apron instead of having them attached directly to the furnace or boiler.

The furnace-door illustrated in Figs. 5 and 6, and shown without the opening mechanism, is the same as above described, with the exception that the apron B is omitted and the door covers the entire opening.

In the modification illustrated by Fig. 7, instead of suspending the two half-doors on a pivot, I arrange them so that they slide between lower and upper guideways, R and T, which may be either inclined or curved. In this case the links C C' are pivoted to a pair of bars, O O', which latter are hung on the common pivot H, and a short pair of links, Q Q', are pivoted to the bottoms of the bars O O' and to the doors A<sup>2</sup> and A<sup>3</sup>, respectively.

The operation of the mechanism described will be readily understood. When the fireman desires to feed the furnace, instead of being obliged to throw the door open with his hand and then take up his shovelful of coal, and after throwing it in shut the door, he only has to step on the pedal K or the inclined bar M, whichever is most convenient for him, if both are provided, and the doors swing apart, and after throwing in his shovelful of coal they close of themselves as soon as he removes his foot. The doors are open for so short a time that very little cold air has a chance to enter, and the apron B cuts off the current of cold air that ordinarily rushes in through the top of the furnace-door when open. In the case of the sliding doors, the operation of the levers slides them apart up the inclined or

curved guideways, and when the pressure is removed they gravitate back into a closed position.

It is not always necessary to provide both of the foot devices shown, or both of the hand devices, for opening the doors. One of the latter is, as a rule, sufficient, and if it is desired to have the doors held open for any length of time for the purpose of checking the fire or otherwise, a suitable device may be provided that will hold the pedal or the handle down, or the doors may be held open by moving the weight out to the end of the lever E.

Having thus described my invention, what I claim as new, is—

1. A furnace-door consisting of two sections, a device which can be operated with the foot, and suitable intermediate mechanism, whereby the two halves of the door move apart when a pressure is exerted upon the foot device and close together automatically when the pressure is removed, substantially as set forth.

2. The combination, with a furnace, of a door consisting of two self-closing sections moving in a vertical plane, a lever, E, and toggle-links connecting the lever with the door-sections, substantially as and for the purpose set forth.

3. The combination, with a furnace, of a door consisting of two self-closing sections moving in a vertical plane, each hung on a pivot, a lever, E, and toggle-links connecting the lever with the door-sections, substantially as and for the purpose set forth.

4. A furnace-door consisting of two sections, in combination with a weighted lever, and toggle-links connecting the lever with the door, a connecting-rod, and a rock-shaft and pedal or an equivalent foot-operating device, substantially as and for the purpose set forth.

5. The combination, with a furnace and furnace-door, of an apron-plate, B, hung on a pivot above the door-opening, and adapted to be swung to one side in the same vertical plane, substantially as and for the purpose set forth.

6. The combination, with a furnace, of the removable apron-plate B, covering the upper part of the door-opening, and adapted to be swung to one side, and a door covering the opening left below said apron-plate, all arranged and operating substantially as described, and for the purpose set forth.

In testimony whereof I affix my signature in presence of two witnesses.

HENRY I. BEARUP.

Witnesses:

WESLEY SMITH,  
HENRY C. DODGE.