JAMES H. BLESSING.

2 Sheets--Sheet 1.

Improvement in Steam-Traps.

No. 114,257. Fig. 1 Patented May 2, 1871.

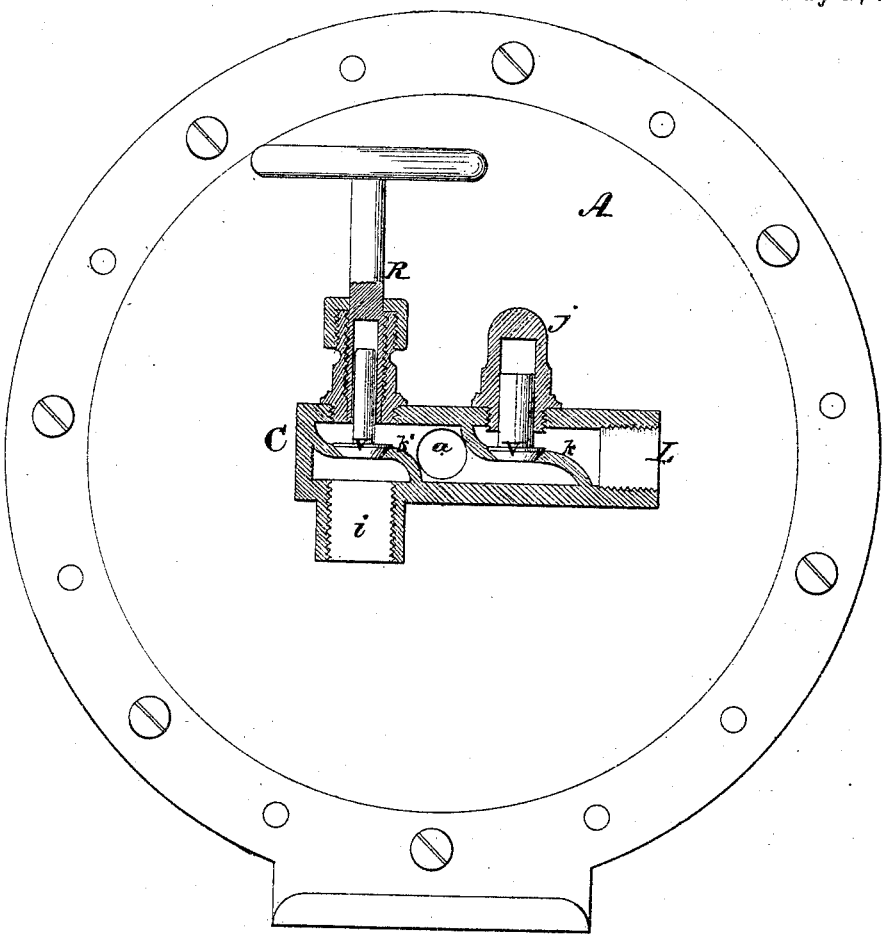


Fig. 2

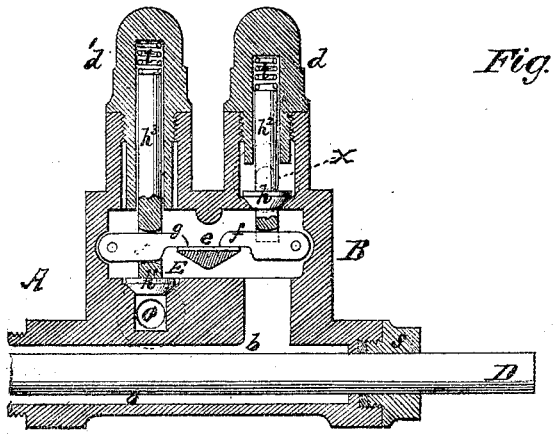
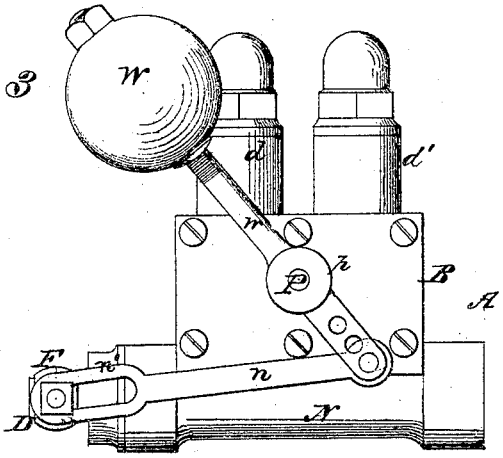


Fig. 3



Witnesses
P. J. Campbell.
J. A. Campbell

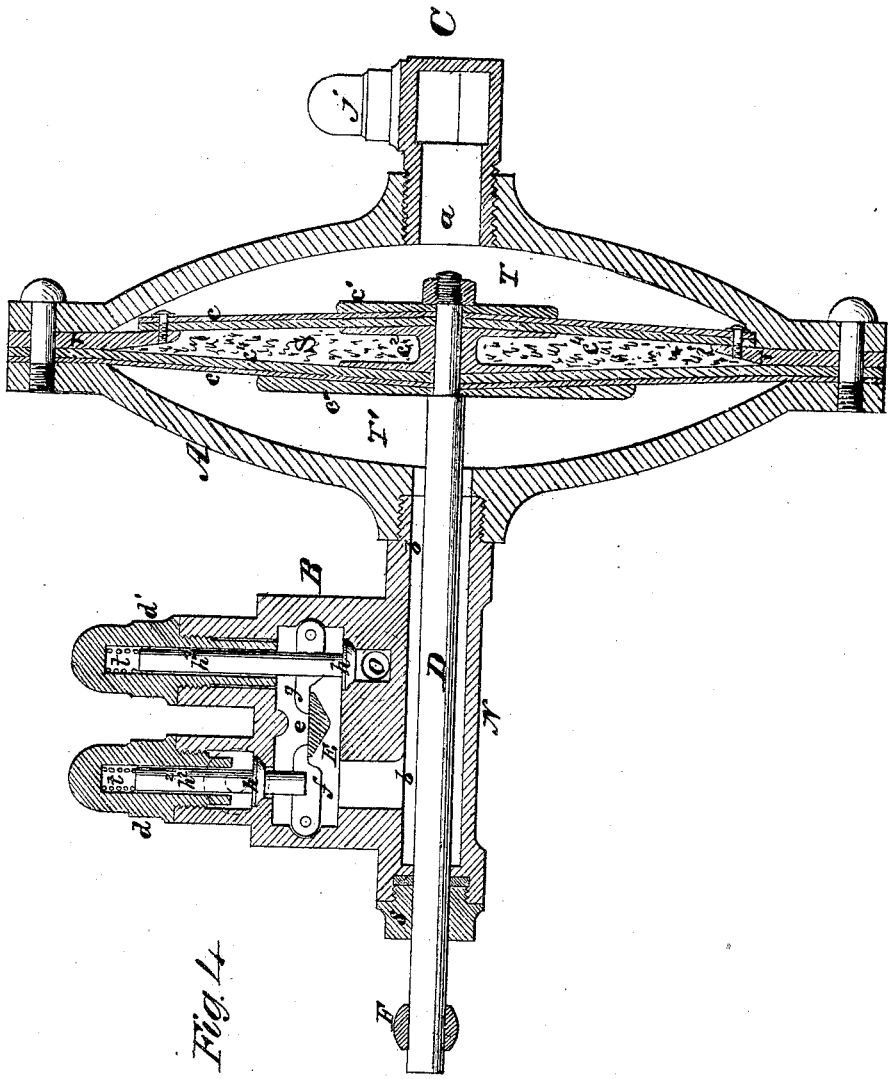
Inventor
James H. Blessing
by
Munn. Fennell & Lawrence

2 Sheets--Sheet 2.

JAMES H. BLESSING.

Improvement in Steam-Traps.

No. 114,257. Patented May 2, 1871.


C
j'
a
T
e
e'
e²
e³
e⁴
e⁵
T'
Z
B
d'
d
d²
g
D
T''
E
f
f'
f²
f³
f⁴
f⁵
f⁶
f⁷
f⁸
f⁹
f¹⁰
f¹¹
f¹²
f¹³
f¹⁴
f¹⁵
f¹⁶
f¹⁷
f¹⁸
f¹⁹
f²⁰
f²¹
f²²
f²³
f²⁴
f²⁵
f²⁶
f²⁷
f²⁸
f²⁹
f³⁰
f³¹
f³²
f³³
f³⁴
f³⁵
f³⁶
f³⁷
f³⁸
f³⁹
f⁴⁰
f⁴¹
f⁴²
f⁴³
f⁴⁴
f⁴⁵
f⁴⁶
f⁴⁷
f⁴⁸
f⁴⁹
f⁵⁰
f⁵¹
f⁵²
f⁵³
f⁵⁴
f⁵⁵
f⁵⁶
f⁵⁷
f⁵⁸
f⁵⁹
f⁶⁰
f⁶¹
f⁶²
f⁶³
f⁶⁴
f⁶⁵
f⁶⁶
f⁶⁷
f⁶⁸
f⁶⁹
f⁷⁰
f⁷¹
f⁷²
f⁷³
f⁷⁴
f⁷⁵
f⁷⁶
f⁷⁷
f⁷⁸
f⁷⁹
f⁸⁰
f⁸¹
f⁸²
f⁸³
f⁸⁴
f⁸⁵
f⁸⁶
f⁸⁷
f⁸⁸
f⁸⁹
f⁹⁰
f⁹¹
f⁹²
f⁹³
f⁹⁴
f⁹⁵
f⁹⁶
f⁹⁷
f⁹⁸
f⁹⁹
f¹⁰⁰
f¹⁰¹
f¹⁰²
f¹⁰³
f¹⁰⁴
f¹⁰⁵
f¹⁰⁶
f¹⁰⁷
f¹⁰⁸
f¹⁰⁹
f¹¹⁰
f¹¹¹
f¹¹²
f¹¹³
f¹¹⁴
f¹¹⁵
f¹¹⁶
f¹¹⁷
f¹¹⁸
f¹¹⁹
f¹²⁰
f¹²¹
f¹²²
f¹²³
f¹²⁴
f¹²⁵
f¹²⁶
f¹²⁷
f¹²⁸
f¹²⁹
f¹³⁰
f¹³¹
f¹³²
f¹³³
f¹³⁴
f¹³⁵
f¹³⁶
f¹³⁷
f¹³⁸
f¹³⁹
f¹⁴⁰
f¹⁴¹
f¹⁴²
f¹⁴³
f¹⁴⁴
f¹⁴⁵
f¹⁴⁶
f¹⁴⁷
f¹⁴⁸
f¹⁴⁹
f¹⁵⁰
f¹⁵¹
f¹⁵²
f¹⁵³
f¹⁵⁴
f¹⁵⁵
f¹⁵⁶
f¹⁵⁷
f¹⁵⁸
f¹⁵⁹
f¹⁶⁰
f¹⁶¹
f¹⁶²
f¹⁶³
f¹⁶⁴
f¹⁶⁵
f¹⁶⁶
f¹⁶⁷
f¹⁶⁸
f¹⁶⁹
f¹⁷⁰
f¹⁷¹
f¹⁷²
f¹⁷³
f¹⁷⁴
f¹⁷⁵
f¹⁷⁶
f¹⁷⁷
f¹⁷⁸
f¹⁷⁹
f¹⁸⁰
f¹⁸¹
f¹⁸²
f¹⁸³
f¹⁸⁴
f¹⁸⁵
f¹⁸⁶
f¹⁸⁷
f¹⁸⁸
f¹⁸⁹
f¹⁹⁰
f¹⁹¹
f¹⁹²
f¹⁹³
f¹⁹⁴
f¹⁹⁵
f¹⁹⁶
f¹⁹⁷
f¹⁹⁸
f¹⁹⁹
f²⁰⁰
f²⁰¹
f²⁰²
f²⁰³
f²⁰⁴
f²⁰⁵
f²⁰⁶
f²⁰⁷
f²⁰⁸
f²⁰⁹
f²¹⁰
f²¹¹
f²¹²
f²¹³
f²¹⁴
f²¹⁵
f²¹⁶
f²¹⁷
f²¹⁸
f²¹⁹
f²²⁰
f²²¹
f²²²
f²²³
f²²⁴
f²²⁵
f²²⁶
f²²⁷
f²²⁸
f²²⁹
f²³⁰
f²³¹
f²³²
f²³³
f²³⁴
f²³⁵
f²³⁶
f²³⁷
f²³⁸
f²³⁹
f²⁴⁰
f²⁴¹
f²⁴²
f²⁴³
f²⁴⁴
f²⁴⁵
f²⁴⁶
f²⁴⁷
f²⁴⁸
f²⁴⁹
f²⁵⁰
f²⁵¹
f²⁵²
f²⁵³
f²⁵⁴
f²⁵⁵
f²⁵⁶
f²⁵⁷
f²⁵⁸
f²⁵⁹
f²⁶⁰
f²⁶¹
f²⁶²
f²⁶³
f²⁶⁴
f²⁶⁵
f²⁶⁶
f²⁶⁷
f²⁶⁸
f²⁶⁹
f²⁷⁰
f²⁷¹
f²⁷²
f²⁷³
f²⁷⁴
f²⁷⁵
f²⁷⁶
f²⁷⁷
f²⁷⁸
f²⁷⁹
f²⁸⁰
f²⁸¹
f²⁸²
f²⁸³
f²⁸⁴
f²⁸⁵
f²⁸⁶
f²⁸⁷
f²⁸⁸
f²⁸⁹
f²⁹⁰
f²⁹¹
f²⁹²
f²⁹³
f²⁹⁴
f²⁹⁵
f²⁹⁶
f²⁹⁷
f²⁹⁸
f²⁹⁹
f³⁰⁰
f³⁰¹
f³⁰²
f³⁰³
f³⁰⁴
f³⁰⁵
f³⁰⁶
f³⁰⁷
f³⁰⁸
f³⁰⁹
f³¹⁰
f³¹¹
f³¹²
f³¹³
f³¹⁴
f³¹⁵
f³¹⁶
f³¹⁷
f³¹⁸
f³¹⁹
f³²⁰
f³²¹
f³²²
f³²³
f³²⁴
f³²⁵
f³²⁶
f³²⁷
f³²⁸
f³²⁹
f³³⁰
f³³¹
f³³²
f³³³
f³³⁴
f³³⁵
f³³⁶
f³³⁷
f³³⁸
f³³⁹
f³⁴⁰
f³⁴¹
f³⁴²
f³⁴³
f³⁴⁴
f³⁴⁵
f³⁴⁶
f³⁴⁷
f³⁴⁸
f³⁴⁹
f³⁵⁰
f³⁵¹
f³⁵²
f³⁵³
f³⁵⁴
f³⁵⁵
f³⁵⁶
f³⁵⁷
f³⁵⁸
f³⁵⁹
f³⁶⁰
f³⁶¹
f³⁶²
f³⁶³
f³⁶⁴
f³⁶⁵
f³⁶⁶
f³⁶⁷
f³⁶⁸
f³⁶⁹
f³⁷⁰
f³⁷¹
f³⁷²
f³⁷³
f³⁷⁴
f³⁷⁵
f³⁷⁶
f³⁷⁷
f³⁷⁸
f³⁷⁹
f³⁸⁰
f³⁸¹
f³⁸²
f³⁸³
f³⁸⁴
f³⁸⁵
f³⁸⁶
f³⁸⁷
f³⁸⁸
f³⁸⁹
f³⁹⁰
f³⁹¹
f³⁹²
f³⁹³
f³⁹⁴
f³⁹⁵
f³⁹⁶
f³⁹⁷
f³⁹⁸
f³⁹⁹
f⁴⁰⁰
f⁴⁰¹
f⁴⁰²
f⁴⁰³
f⁴⁰⁴
f⁴⁰⁵
f⁴⁰⁶
f⁴⁰⁷
f⁴⁰⁸
f⁴⁰⁹
f⁴¹⁰
f⁴¹¹
f⁴¹²
f⁴¹³
f⁴¹⁴
f⁴¹⁵
f⁴¹⁶
f⁴¹⁷
f⁴¹⁸
f⁴¹⁹
f⁴²⁰
f⁴²¹
f⁴²²
f⁴²³
f⁴²⁴
f⁴²⁵
f⁴²⁶
f⁴²⁷
f⁴²⁸
f⁴²⁹
f⁴³⁰
f⁴³¹
f⁴³²
f⁴³³
f⁴³⁴
f⁴³⁵
f⁴³⁶
f⁴³⁷
f⁴³⁸
f⁴³⁹
f⁴⁴⁰
f⁴⁴¹
f⁴⁴²
f⁴⁴³
f⁴⁴⁴
f⁴⁴⁵
f⁴⁴⁶
f⁴⁴⁷
f⁴⁴⁸
f⁴⁴⁹
f⁴⁵⁰
f⁴⁵¹
f⁴⁵²
f⁴⁵³
f⁴⁵⁴
f⁴⁵⁵
f⁴⁵⁶
f⁴⁵⁷
f⁴⁵⁸
f⁴⁵⁹
f⁴⁶⁰
f⁴⁶¹
f⁴⁶²
f⁴⁶³
f⁴⁶⁴
f⁴⁶⁵
f⁴⁶⁶
f⁴⁶⁷
f⁴⁶⁸
f⁴⁶⁹
f⁴⁷⁰
f⁴⁷¹
f⁴⁷²
f⁴⁷³
f⁴⁷⁴
f⁴⁷⁵
f⁴⁷⁶
f⁴⁷⁷
f⁴⁷⁸
f⁴⁷⁹
f⁴⁸⁰
f⁴⁸¹
f⁴⁸²
f⁴⁸³
f⁴⁸⁴
f⁴⁸⁵
f⁴⁸⁶
f⁴⁸⁷
f⁴⁸⁸
f⁴⁸⁹
f⁴⁹⁰
f⁴⁹¹
f⁴⁹²
f⁴⁹³
f⁴⁹⁴
f⁴⁹⁵
f⁴⁹⁶
f⁴⁹⁷
f⁴⁹⁸
f⁴⁹⁹
f⁵⁰⁰
f⁵⁰¹
f⁵⁰²
f⁵⁰³
f⁵⁰⁴
f⁵⁰⁵
f⁵⁰⁶
f⁵⁰⁷
f⁵⁰⁸
f⁵⁰⁹
f⁵¹⁰
f⁵¹¹
f⁵¹²
f⁵¹³
f⁵¹⁴
f⁵¹⁵
f⁵¹⁶
f⁵¹⁷
f⁵¹⁸
f⁵¹⁹
f⁵²⁰
f⁵²¹
f⁵²²
f⁵²³
f⁵²⁴
f⁵²⁵
f⁵²⁶
f⁵²⁷
f⁵²⁸
f⁵²⁹
f⁵³⁰
f⁵³¹
f⁵³²
f⁵³³
f⁵³⁴
f⁵³⁵
f⁵³⁶
f⁵³⁷
f⁵³⁸
f⁵³⁹
f⁵⁴⁰
f⁵⁴¹
f⁵⁴²
f⁵⁴³
f⁵⁴⁴
f⁵⁴⁵
f⁵⁴⁶
f⁵⁴⁷
f⁵⁴⁸
f⁵⁴⁹
f⁵⁵⁰
f⁵⁵¹
f⁵⁵²
f⁵⁵³
f⁵⁵⁴
f⁵⁵⁵
f⁵⁵⁶
f⁵⁵⁷
f⁵⁵⁸
f⁵⁵⁹
f⁵⁶⁰
f⁵⁶¹
f⁵⁶²
f⁵⁶³
f⁵⁶⁴
f⁵⁶⁵
f⁵⁶⁶
f⁵⁶⁷
f⁵⁶⁸
f⁵⁶⁹
f⁵⁷⁰
f⁵⁷¹
f⁵⁷²
f⁵⁷³
f⁵⁷⁴
f⁵⁷⁵
f⁵⁷⁶
f⁵⁷⁷
f⁵⁷⁸
f⁵⁷⁹
f⁵⁸⁰
f⁵⁸¹
f⁵⁸²
f⁵⁸³
f⁵⁸⁴
f⁵⁸⁵
f⁵⁸⁶
f⁵⁸⁷
f⁵⁸⁸
f⁵⁸⁹
f⁵⁹⁰
f⁵⁹¹
f⁵⁹²
f⁵⁹³
f⁵⁹⁴
f⁵⁹⁵
f⁵⁹⁶
f⁵⁹⁷
f⁵⁹⁸
f⁵⁹⁹
f⁶⁰⁰
f⁶⁰¹
f⁶⁰²
f⁶⁰³
f⁶⁰⁴
f⁶⁰⁵
f⁶⁰⁶
f⁶⁰⁷
f⁶⁰⁸
f⁶⁰⁹
f⁶¹⁰
f⁶¹¹
f⁶¹²
f⁶¹³
f⁶¹⁴
f⁶¹⁵
f⁶¹⁶
f⁶¹⁷
f⁶¹⁸
f⁶¹⁹
f⁶²⁰
f⁶²¹
f⁶²²
f⁶²³
f⁶²⁴
f⁶²⁵
f⁶²⁶
f⁶²⁷
f⁶²⁸
f⁶²⁹
f⁶³⁰
f⁶³¹
f⁶³²
f⁶³³
f⁶³⁴
f⁶³⁵
f⁶³⁶
f⁶³⁷
f⁶³⁸
f⁶³⁹
f⁶⁴⁰
f⁶⁴¹
f⁶⁴²
f⁶⁴³
f⁶⁴⁴
f⁶⁴⁵
f⁶⁴⁶
f⁶⁴⁷
f⁶⁴⁸
f⁶⁴⁹
f⁶⁵⁰
f⁶⁵¹
f⁶⁵²
f⁶⁵³
f⁶⁵⁴
f⁶⁵⁵
f⁶⁵⁶
f⁶⁵⁷
f⁶⁵⁸
f⁶⁵⁹
f⁶⁶⁰
f⁶⁶¹
f⁶⁶²
f⁶⁶³
f⁶⁶⁴
f⁶⁶⁵
f⁶⁶⁶
f⁶⁶⁷
f⁶⁶⁸
f⁶⁶⁹
f⁶⁷⁰
f⁶⁷¹
f⁶⁷²
f⁶⁷³
f⁶⁷⁴
f⁶⁷⁵
f⁶⁷⁶
f⁶⁷⁷
f⁶⁷⁸
f⁶⁷⁹
f⁶⁸⁰
f⁶⁸¹
f⁶⁸²
f⁶⁸³
f⁶⁸⁴
f⁶⁸⁵
f⁶⁸⁶
f⁶⁸⁷
f⁶⁸⁸
f⁶⁸⁹
f⁶⁹⁰
f⁶⁹¹
f⁶⁹²
f⁶⁹³
f⁶⁹⁴
f⁶⁹⁵
f⁶⁹⁶
f⁶⁹⁷
f⁶⁹⁸
f⁶⁹⁹
f⁷⁰⁰
f⁷⁰¹
f⁷⁰²
f⁷⁰³
f⁷⁰⁴
f⁷⁰⁵
f⁷⁰⁶
f⁷⁰⁷
f⁷⁰⁸
f⁷⁰⁹
f⁷¹⁰
f⁷¹¹
f⁷¹²
f⁷¹³
f⁷¹⁴
f⁷¹⁵
f⁷¹⁶
f⁷¹⁷
f⁷¹⁸
f⁷¹⁹
f⁷²⁰
f⁷²¹
f⁷²²
f⁷²³
f⁷²⁴
f⁷²⁵
f⁷²⁶
f⁷²⁷
f⁷²⁸
f⁷²⁹
f⁷³⁰
f⁷³¹
f⁷³²
f⁷³³
f⁷³⁴
f⁷³⁵
f⁷³⁶
f⁷³⁷
f⁷³⁸
f⁷³⁹
f⁷⁴⁰
f⁷⁴¹
f⁷⁴²
f⁷⁴³
f⁷⁴⁴
f⁷⁴⁵
f⁷⁴⁶
f⁷⁴⁷
f⁷⁴⁸
f⁷⁴⁹
f⁷⁵⁰
f⁷⁵¹
f⁷⁵²
f⁷⁵³
f⁷⁵⁴
f⁷⁵⁵
f⁷⁵⁶
f⁷⁵⁷
f⁷⁵⁸
f⁷⁵⁹
f⁷⁶⁰
f⁷⁶¹
f⁷⁶²
f⁷⁶³
f⁷⁶⁴
f⁷⁶⁵
f⁷⁶⁶
f⁷⁶⁷
f⁷⁶⁸
f⁷⁶⁹
f⁷⁷⁰
f⁷⁷¹
f⁷⁷²
f⁷⁷³
f⁷⁷⁴
f⁷⁷⁵
f⁷⁷⁶
f⁷⁷⁷
f⁷⁷⁸
f⁷⁷⁹
f⁷⁸⁰
f⁷⁸¹
f⁷⁸²
f⁷⁸³
f⁷⁸⁴
f⁷⁸⁵
f⁷⁸⁶
f⁷⁸⁷
f⁷⁸⁸
f⁷⁸⁹
f⁷⁹⁰
f⁷⁹¹
f⁷⁹²
f⁷⁹³
f⁷⁹⁴
f⁷⁹⁵
f⁷⁹⁶
f⁷⁹⁷
f⁷⁹⁸
f⁷⁹⁹
f⁸⁰⁰
f⁸⁰¹
f⁸⁰²
f⁸⁰³
f⁸⁰⁴
f⁸⁰⁵
f⁸⁰⁶
f⁸⁰⁷
f⁸⁰⁸
f⁸⁰⁹
f⁸¹⁰
f⁸¹¹
f⁸¹²
f⁸¹³
f⁸¹⁴
f⁸¹⁵
f⁸¹⁶
f⁸¹⁷
f⁸¹⁸
f⁸¹⁹
f⁸²⁰
f⁸²¹
f⁸²²
f⁸²³
f⁸²⁴
f⁸²⁵
f⁸²⁶
f⁸²⁷
f⁸²⁸
f⁸²⁹
f⁸³⁰
f⁸³¹
f⁸³²
f⁸³³
f⁸³⁴
f⁸³⁵
f⁸³⁶
f⁸³⁷
f⁸³⁸
f⁸³⁹
f⁸⁴⁰
f⁸⁴¹
f⁸⁴²
f⁸⁴³
f⁸⁴⁴
f⁸⁴⁵
f⁸⁴⁶
f⁸⁴⁷
f⁸⁴⁸
f⁸⁴⁹
f⁸⁵⁰
f⁸⁵¹
f⁸⁵²
f⁸⁵³
f⁸⁵⁴
f⁸⁵⁵
f⁸⁵⁶
f⁸⁵⁷
f⁸⁵⁸
f⁸⁵⁹
f⁸⁶⁰
f⁸⁶¹
f⁸⁶²
f⁸⁶³
f⁸⁶⁴
f⁸⁶⁵
f⁸⁶⁶
f⁸⁶⁷
f⁸⁶⁸
f⁸⁶⁹
f⁸⁷⁰
f⁸⁷¹
f⁸⁷²
f⁸⁷³
f⁸⁷⁴
f⁸⁷⁵
f⁸⁷⁶
f⁸⁷⁷
f⁸⁷⁸
f⁸⁷⁹
f⁸⁸⁰
f⁸⁸¹
f⁸⁸²
f⁸⁸³
f⁸⁸⁴
f⁸⁸⁵
f⁸⁸⁶
f⁸⁸⁷
f⁸⁸⁸
f⁸⁸⁹
f⁸⁹⁰
f⁸⁹¹
f⁸⁹²
f⁸⁹³
f⁸⁹⁴
f⁸⁹⁵
f⁸⁹⁶
f⁸⁹⁷
f⁸⁹⁸
f⁸⁹⁹
f⁹⁰⁰
f⁹⁰¹
f⁹⁰²
f⁹⁰³
f⁹⁰⁴
f⁹⁰⁵
f⁹⁰⁶
f⁹⁰⁷
f⁹⁰⁸
f⁹⁰⁹
f⁹¹⁰
f⁹¹¹
f⁹¹²
f⁹¹³
f⁹¹⁴
f⁹¹⁵
f⁹¹⁶
f⁹¹⁷
f⁹¹⁸
f⁹¹⁹
f⁹²⁰
f⁹²¹
f⁹²²
f⁹²³
f⁹²⁴
f⁹²⁵
f⁹²⁶
f⁹²⁷
f⁹²⁸
f⁹²⁹
f⁹³⁰
f⁹³¹
f⁹³²
f⁹³³
f⁹³⁴
f⁹³⁵
f⁹³⁶
f⁹³⁷
f⁹³⁸
f⁹³⁹
f⁹⁴⁰
f⁹⁴¹
f⁹⁴²
f⁹⁴³
f⁹⁴⁴
f⁹⁴⁵
f⁹⁴⁶
f⁹⁴⁷
f⁹⁴⁸
f⁹⁴⁹
f⁹⁵⁰
f⁹⁵¹
f⁹⁵²
f⁹⁵³
f⁹⁵⁴
f⁹⁵⁵
f⁹⁵⁶
f⁹⁵⁷
f⁹⁵⁸
f⁹⁵⁹
f⁹⁶⁰
f⁹⁶¹
f⁹⁶²
f⁹⁶³
f⁹⁶⁴
f⁹⁶⁵
f⁹⁶⁶
f⁹⁶⁷
f⁹⁶⁸
f⁹⁶⁹
f⁹⁷⁰
f⁹⁷¹
f⁹⁷²
f⁹⁷³
f⁹⁷⁴
f⁹⁷⁵
f⁹⁷⁶
f⁹⁷⁷
f⁹⁷⁸
f⁹⁷⁹
f⁹⁸⁰
f⁹⁸¹
f⁹⁸²
f⁹⁸³
f⁹⁸⁴
f⁹⁸⁵
f⁹⁸⁶
f⁹⁸⁷
f⁹⁸⁸
f⁹⁸⁹
f⁹⁹⁰
f⁹⁹¹
f⁹⁹²
f⁹⁹³
f⁹⁹⁴
f⁹⁹⁵
f⁹⁹⁶
f⁹⁹⁷
f⁹⁹⁸
f⁹⁹⁹
f¹⁰⁰⁰
f¹⁰⁰¹
f¹⁰⁰²
f¹⁰⁰³
f¹⁰⁰⁴
f¹⁰⁰⁵
f¹⁰⁰⁶
f¹⁰⁰⁷
f¹⁰⁰⁸
f¹⁰⁰⁹
f¹⁰¹⁰
f¹⁰¹¹
f¹⁰¹²
f¹⁰¹³
f¹⁰¹⁴
f¹⁰¹⁵
f¹⁰¹⁶
f¹⁰¹⁷
f¹⁰¹⁸
f¹⁰¹⁹
f¹⁰²⁰
f¹⁰²¹
f¹⁰²²
f¹⁰²³
f¹⁰²⁴
f¹⁰²⁵
f¹⁰²⁶
f¹⁰²⁷
f¹⁰²⁸
f¹⁰²⁹
f¹⁰³⁰
f¹⁰³¹
f¹⁰³²
f¹⁰³³
f¹⁰³⁴
f¹⁰³⁵
f¹⁰³⁶
f¹⁰³⁷
f¹⁰³⁸
f¹⁰³⁹
f¹⁰⁴⁰
f¹⁰⁴¹
f¹⁰⁴²
f¹⁰⁴³
f¹⁰⁴⁴
f¹⁰⁴⁵
f¹⁰⁴⁶
f¹⁰⁴⁷
f¹⁰⁴⁸
f¹⁰⁴⁹
f¹⁰⁵⁰
f¹⁰⁵¹
f¹⁰⁵²
f¹⁰⁵³
f¹⁰⁵⁴
f¹⁰⁵⁵
f¹⁰⁵⁶
f¹⁰⁵⁷
f¹⁰⁵⁸
f¹⁰⁵⁹
f¹⁰⁶⁰
f¹⁰⁶¹
f¹⁰⁶²
f¹⁰⁶³
f¹⁰⁶⁴
f¹⁰⁶⁵
f¹⁰⁶⁶
f¹⁰⁶⁷
f¹⁰⁶⁸
f¹⁰⁶⁹
f¹⁰⁷⁰
f¹⁰⁷¹
f¹⁰⁷²
f¹⁰⁷³
f¹⁰⁷⁴
f¹⁰⁷⁵
f¹⁰⁷⁶
f¹⁰⁷⁷
f¹⁰⁷⁸
f¹⁰⁷⁹
f¹⁰⁸⁰
f¹⁰⁸¹
f¹⁰⁸²
f¹⁰⁸³
f¹⁰⁸⁴
f¹⁰⁸⁵
f¹⁰⁸⁶
f¹⁰⁸⁷
f¹⁰⁸⁸
f¹⁰⁸⁹
f¹⁰⁹⁰
f¹⁰⁹¹
f¹⁰⁹²
f¹⁰⁹³
f¹⁰⁹⁴
f¹⁰⁹⁵
f¹⁰⁹⁶
f¹⁰⁹⁷
f¹⁰⁹⁸
f¹⁰⁹⁹
f¹¹⁰⁰
f¹¹⁰¹
f¹¹⁰²
f¹¹⁰³
f¹¹⁰⁴
f¹¹⁰⁵
f¹¹⁰⁶
f¹¹⁰⁷
f¹¹⁰⁸
f¹¹⁰⁹
f¹¹¹⁰
f¹¹¹¹
f¹¹¹²
f¹¹¹³
f¹¹¹⁴
f¹¹¹⁵
f¹¹¹⁶
f¹¹¹⁷
f¹¹¹⁸
f¹¹¹⁹
f¹¹²⁰
f¹¹²¹
f¹¹²²
f¹¹²³
f¹¹²⁴
f¹¹²⁵
f¹¹²⁶
f¹¹²⁷
f¹¹²⁸
f¹¹²⁹
f¹¹³⁰
f¹¹³¹
f¹¹³²
f¹¹³³
f¹¹³⁴
f¹¹³⁵
f¹¹³⁶
f¹¹³⁷
f¹¹³⁸
f¹¹³⁹
f¹¹⁴⁰
f¹¹⁴¹
f¹¹⁴²
f¹¹⁴³
f¹¹⁴⁴
f¹¹⁴⁵
f¹¹⁴⁶
f¹¹⁴⁷
f¹¹⁴⁸
f¹¹⁴⁹
f¹¹⁵⁰
f¹¹⁵¹
f¹¹⁵²
f¹¹⁵³
f¹¹⁵⁴
f¹¹⁵⁵
f¹¹⁵⁶
f¹¹⁵⁷
f¹¹⁵⁸
f¹¹⁵⁹
f¹¹⁶⁰
f¹¹⁶¹
f¹¹⁶²
f¹¹⁶³
f¹¹⁶⁴
f¹¹⁶⁵
f¹¹⁶⁶
f¹¹⁶⁷
f¹¹⁶⁸
f¹¹⁶⁹
f¹¹⁷⁰
f¹¹⁷¹
f¹¹⁷²
f¹¹⁷³
f¹¹⁷⁴
f¹¹⁷⁵
f¹¹⁷⁶
f¹¹⁷⁷
f¹¹⁷⁸
f¹¹⁷⁹
f¹¹⁸⁰
f¹¹⁸¹
f¹¹⁸²
f¹¹⁸³
f¹¹⁸⁴
f¹¹⁸⁵
f¹¹⁸⁶
f¹¹⁸⁷
f¹¹⁸⁸
f¹¹⁸⁹
f¹¹⁹⁰
f¹¹⁹¹
f¹¹⁹²
f¹¹⁹³
f¹¹⁹⁴
f¹¹⁹⁵
f¹¹⁹⁶
f¹¹⁹⁷
f¹¹⁹⁸
f¹¹⁹⁹
f¹²⁰⁰
f¹²⁰¹
f¹²⁰²
f¹²⁰³
f¹²⁰⁴
f¹²⁰⁵
f¹²⁰⁶
f¹²⁰⁷
f¹²⁰⁸
f¹²⁰⁹
f¹²¹⁰
f¹²¹¹
f¹²¹²
f¹²¹³
f¹²¹⁴
f¹²¹⁵
f¹²¹⁶
f¹²¹⁷
f¹²¹⁸
f¹²¹⁹
f¹²²⁰
f¹²²¹
f¹²²²
f¹²²³
f¹²²⁴
f¹²²⁵
f¹²²⁶
f¹²²⁷
f¹²²⁸
f¹²²⁹
f¹²³⁰
f¹²³¹
f¹²³²
f¹²³³
f¹²³⁴
f¹²³⁵
f¹²³⁶
f¹²³⁷
f¹²³⁸
f¹²³⁹
f¹²⁴⁰
f¹²⁴¹
f¹²⁴²
f¹²⁴³
f¹²⁴⁴
f¹²⁴⁵
f¹²⁴⁶
f¹²⁴⁷
f¹²⁴⁸
f¹²⁴⁹
f¹²⁵⁰
f¹²⁵¹
f¹²⁵²
f¹²⁵³
f¹²⁵⁴
f¹²⁵⁵
f¹²⁵⁶
f¹²⁵⁷
f¹²⁵⁸
f¹²⁵⁹
f¹²⁶⁰
f¹²⁶¹
f¹²⁶²
f¹²⁶³
f¹²⁶⁴
f¹²⁶⁵
f¹²⁶⁶
f¹²⁶⁷
f¹²⁶⁸
f¹²⁶⁹
f¹²⁷⁰
f¹²⁷¹
f¹²⁷²
f¹²⁷³
f¹²⁷⁴
f¹²⁷⁵
f¹²⁷⁶
f¹²⁷⁷
f¹²⁷⁸
f¹²⁷⁹
f¹²⁸⁰
f¹²⁸¹
f¹²⁸²
f¹²⁸³
f¹²⁸⁴
f¹²⁸⁵
f¹²⁸⁶
f¹²⁸⁷
f¹²⁸⁸
f¹²⁸⁹
f¹²⁹⁰
f¹²⁹¹
f¹²⁹²
f¹²⁹³
f¹²⁹⁴
f¹²⁹⁵
f¹²⁹⁶
f¹²⁹⁷
f¹²⁹⁸
f¹²⁹⁹
f¹³⁰⁰
f¹³⁰¹
f¹³⁰²
f¹³⁰³
f¹³⁰⁴
f¹³⁰⁵
f¹³⁰⁶
f¹³⁰⁷
f¹³⁰⁸
f¹³⁰⁹
f¹³¹⁰
f¹³¹¹
f¹³¹²
f¹³¹³
f¹³¹⁴
f¹³¹⁵
f¹³¹⁶
f¹³¹⁷
f¹³¹⁸
f¹³¹⁹
f¹³²⁰
f¹³²¹
f¹³²²
f¹³²³
f¹³²⁴
f¹³²⁵
f¹³²⁶
f¹³²⁷
f¹³²⁸
f¹³²⁹
f¹³³⁰
f¹³³¹
f¹³³²
f¹³³³
f¹³³⁴
f¹³³⁵
f¹³³⁶
f¹³³⁷
f¹³³⁸
f¹³³⁹
f¹³⁴⁰
f¹³⁴¹
f¹³⁴²
f¹³⁴³
f¹³⁴⁴
f¹³⁴⁵
f¹³⁴⁶
f¹³⁴⁷
f¹³⁴⁸
f¹³⁴⁹
f¹³⁵⁰
f¹³⁵¹
f¹³⁵²
f¹³⁵³
f¹³⁵⁴
f¹³⁵⁵
f¹³⁵⁶
f¹³⁵⁷
f¹³⁵⁸
f¹³⁵⁹
f¹³⁶⁰
f¹³⁶¹
f¹³⁶²
f¹³⁶³
f¹³⁶⁴
f¹³⁶⁵
f¹³⁶⁶
f¹³⁶⁷
f¹³⁶⁸
f¹³⁶⁹
f¹³⁷⁰
f¹³⁷¹
f¹³⁷²
f¹³⁷³
f¹³⁷⁴
f¹³⁷⁵
f¹³⁷⁶
f¹³⁷⁷
f¹³⁷⁸
f¹³⁷⁹
f¹³⁸⁰
f¹³⁸¹
f¹³⁸²
f¹³⁸³
f¹³⁸⁴
f¹³⁸⁵
f¹³⁸⁶
f¹³⁸⁷
f¹³⁸⁸
f¹³⁸⁹
f¹³⁹⁰
f¹³⁹¹
f¹³⁹²
f¹³⁹³
f¹³⁹⁴
f¹³⁹⁵
f¹³⁹⁶
f¹³⁹⁷
f¹³⁹⁸
f¹³⁹⁹
f¹⁴⁰⁰
f¹⁴⁰¹
f¹⁴⁰²
f¹⁴⁰³
f¹⁴⁰⁴
f¹⁴⁰⁵
f¹⁴⁰⁶
f¹⁴⁰⁷
f¹⁴⁰⁸
f¹⁴⁰⁹
f¹⁴¹⁰
f¹⁴¹¹
f¹⁴¹²
f¹⁴¹³
f¹⁴¹⁴
f¹⁴¹⁵
f¹⁴¹⁶
f¹⁴¹⁷
f¹⁴¹⁸
f¹⁴¹⁹
f¹⁴²⁰
f¹⁴²¹
f¹⁴²²
f¹⁴²³
f¹⁴²⁴
f¹⁴²⁵
f¹⁴²⁶
f¹⁴²⁷
f¹⁴²⁸
f¹⁴²⁹
f¹⁴³⁰
f¹⁴³¹
f¹⁴³²
f¹⁴³³
f¹⁴³⁴
f¹⁴³⁵
f¹⁴³⁶
f¹⁴³⁷
f¹⁴³⁸
f¹⁴³⁹
f¹⁴⁴⁰
f¹⁴⁴¹
f¹⁴⁴²
f¹⁴⁴³
f¹⁴⁴⁴
f¹⁴⁴⁵
f¹⁴⁴⁶
f¹⁴⁴⁷
f¹⁴⁴⁸
f¹⁴⁴⁹
f¹⁴⁵⁰
f¹⁴⁵¹
f¹⁴⁵²
f¹⁴⁵³
f¹⁴⁵⁴
f¹⁴⁵⁵
f¹⁴⁵⁶
f¹⁴⁵⁷
f¹⁴⁵⁸
f¹⁴⁵⁹
f¹⁴⁶⁰
f¹⁴⁶¹
f¹⁴⁶²
f¹⁴⁶³
f¹⁴⁶⁴
f¹⁴⁶⁵
f¹⁴⁶⁶
f¹⁴⁶⁷
f¹⁴⁶⁸
f¹⁴⁶⁹
f¹⁴⁷⁰
f¹⁴⁷¹
f¹⁴⁷²
f¹⁴⁷³
f¹⁴⁷⁴
f¹⁴⁷⁵
f¹⁴⁷⁶
f¹⁴⁷⁷
f¹⁴⁷⁸
f¹⁴⁷⁹
f¹⁴⁸⁰
f¹⁴⁸¹
f¹⁴⁸²
f¹⁴⁸³
f¹⁴⁸⁴
f¹⁴⁸⁵
f¹⁴⁸⁶
f¹⁴⁸⁷
f¹⁴⁸⁸
f¹⁴⁸⁹
f¹⁴⁹⁰
f¹⁴⁹¹
f¹⁴⁹²
f¹⁴⁹³
f¹⁴⁹⁴
f¹⁴⁹⁵
f¹⁴⁹⁶
f¹⁴⁹⁷
f¹⁴⁹⁸
f¹⁴⁹⁹
f¹⁵⁰⁰
f¹⁵⁰¹
f¹⁵⁰²
f¹⁵⁰³
f¹⁵⁰⁴
f¹⁵⁰⁵
f¹⁵⁰⁶
f¹⁵⁰⁷
f¹⁵⁰⁸
f¹⁵⁰⁹
f¹⁵¹⁰
f¹⁵¹¹
f¹⁵¹²
f¹⁵¹³
f¹⁵¹⁴
f¹⁵¹⁵
f¹⁵¹⁶
f¹⁵¹⁷
f¹⁵¹⁸
f¹⁵¹⁹
f¹⁵²⁰
f¹⁵²¹
f¹⁵²²
f¹⁵²³
f¹⁵²⁴
f¹⁵²⁵
f¹⁵²⁶
f¹⁵²⁷
f¹⁵²⁸
f¹⁵²⁹
f¹⁵³⁰
f¹⁵³¹
f¹⁵³²
f¹⁵³³
f¹⁵³⁴
f¹⁵³⁵
f¹⁵³⁶
f¹⁵³⁷
f¹⁵³⁸
f¹⁵³⁹
f¹⁵⁴⁰
f¹⁵⁴¹
f¹⁵⁴²
f¹⁵⁴³
f¹⁵⁴⁴
f¹⁵⁴⁵
f¹⁵⁴⁶
f¹⁵⁴⁷
f¹⁵⁴⁸
f¹⁵⁴⁹
f¹⁵⁵⁰
f¹⁵⁵¹
f¹⁵⁵²
f¹⁵⁵³
f¹⁵⁵⁴
f¹⁵⁵⁵
f¹⁵⁵⁶
f¹⁵⁵⁷
f¹⁵⁵⁸
f¹⁵⁵⁹
f¹⁵⁶⁰
f¹⁵⁶¹
f¹⁵⁶²
f¹⁵⁶³
f¹⁵⁶⁴
f¹⁵⁶⁵
f¹⁵⁶⁶
f¹⁵⁶⁷
f¹⁵⁶⁸
f¹⁵⁶⁹
f¹⁵⁷⁰
f¹⁵⁷¹
f¹⁵⁷²
f¹⁵⁷³
f¹⁵⁷⁴
f¹⁵⁷⁵
f¹⁵⁷⁶
f¹⁵⁷⁷
f¹⁵⁷⁸
f¹⁵⁷⁹
f¹⁵⁸⁰
f¹⁵⁸¹
f¹⁵⁸²
f¹⁵⁸³
f¹⁵⁸⁴
f¹⁵⁸⁵
f¹⁵⁸⁶
f¹⁵⁸⁷
f¹⁵⁸⁸
f¹⁵⁸⁹
f¹⁵⁹⁰
f¹⁵⁹¹
f¹⁵⁹²
f¹⁵⁹³
f¹⁵⁹⁴
f¹⁵⁹⁵
f¹⁵⁹⁶

United States Patent Office.

JAMES H. BLESSING, OF ALBANY, NEW YORK, ASSIGNOR TO HIMSELF AND FREDERICK TOWNSEND, OF SAME PLACE.

Letters Patent No. 114,257, dated May 2, 1871.

IMPROVEMENT IN STEAM-TRAPS.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, JAMES H. BLESSING, of Albany, in the county of Albany and State of New York, have invented a new and improved Steam-Trap; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawing making part of this specification, in which—

Figure 1, plate 1, is an elevation of one side of the case of the trap, showing the receiving and discharging hot-water valve-box.

Figure 2, plate 1, is a vertical section through a valve-box for receiving and discharging the actuating agent.

Figure 3, plate 1, is a view of one side of the valve-box of fig. 2, showing the mechanism for tripping the valves in this box.

Figure 4, plate 2, is a vertical section taken centrally through the trap-case, and its two valve-boxes and flexible diaphragm.

Similar letters of reference indicate corresponding parts in the several figures.

The object of my invention is to so construct a trap, to be used in combination with apparatus for heating buildings by steam, that the water of condensation will be automatically forced back again into the boiler, thus keeping the latter constantly supplied with pure hot water, as will be hereinafter explained.

To enable others skilled in the art to understand my invention, I will explain its construction and operation.

In the accompanying drawing—

A represents a case, which is preferably made of two concavo-convex plates, bolted together by their flanges, as shown in fig. 4.

This case A contains within it a flexible diaphragm, S, which divides it into two apartments, T T', between which there is no communication whatever.

The diaphragm S is constructed of water-proof canvas c c, rubber c^4 c^4, and an interposed filling of felt, or other suitable non-conducting substance in lieu of the felt. The object of this non-conducting flexible diaphragm will be hereinafter explained.

The end of the water-pipe containing the hot water which was condensed in the heat-radiating coils or conduits of the warming apparatus is connected at i to one end of the valve-box C, which is fastened to case A so as to communicate by way of passage a with the apartment T on one side of diaphragm S.

Directly above inlet-pipe i is a partition, k', having a seat for receiving an inlet-valve, V, the stem of which is received into the bore of an adjusting hand-wheel stem, R, as shown in fig. 1, plate 1.

Between the partition k', which is perforated and provided with an outlet, L, of the valve-box C, is another partition, k, which is perforated and provided with an outlet, V', beneath which the hot water escapes on its way back to the boiler as this water is forced out of the apartment T through passage a.

The valve V prevents the hot water from passing back to the boiler from the valve-box, and the valve V' prevents the hot water in pipe L from passing back into the valve-box.

By means of a flanged hub, c^2, the diaphragm is centrally secured to a rod, D, which rod passes through a cylindrical chamber, b, inclosed in a tube, N, which tube has a stuffing-box, s, of suitable description applied to its outer end, through which the rod D passes, as shown in fig. 4.

The tube N communicates with the apartment T' of case A, and also with a chamber, E, which is contained within a valve-box, B, constructed on top of the tube N.

In the center of the chamber E is an oscillating rocking valve-trip, e, which is applied fast on a horizontal transverse stem, P, carrying on its outer end a slotted collar, p, shown in fig. 3.

On the extremities of the trip e the free ends of pivoted valve-lifters f g rest.

The valve-lifter f receives upon it the bifurcated end of the valve-stem h^2 of a receiving-valve, h, which when lifted allows either water, air, or steam, under pressure, to enter the chamber E through a receiving passage, x.

The valve-lifter g passes through the stem h^3 of a valve, h', which latter is intended for closing an outlet or waste-passage, O.

The springs t t in caps d d' operate respectively upon the valve-stems h^2 h^3 to keep the valves down upon their seat when they are not acted on by the lifting devices.

To the outer end of the rod D an arm, F, is rigidly secured, the outer end of which is reduced, screw-threaded, and provided with a nut.

On this reduced end of arm F the slotted end n' of a connecting-rod, n, is applied so as to slide freely, limited only by the length of the slot.

The opposite end of the rod n is pivoted to the lower shortest arm of a vertically-vibrating loaded arm, w, which has a weight, W, applied on its upper end, as shown in fig. 3.

I have thus described the several parts constituting my improved steam-trap. The operation is as follows:

The trap is adjusted in communication with a system of steam-heating pipes or coils so that the water of condensation can pass into the apartment T of case A, through valve-box C, and out again through the pipe L leading to the boiler.

On the opposite side of the case A a pipe leading

from a hydrant, *a*, reservoir, or other suitable source from which a head of water can be conveniently obtained, is put in communication with the inlet-passage X, above valve *h*, so that when this valve *h* is raised (the opposite or outlet-valve h^1 being shut) the water under pressure will rush through chamber E, through passage *b*, and into the apartment T' of case A. The outlet-pipe O may be carried off wherever it may be convenient to discharge the waste water.

The steam from the boiler is admitted to the system of heat-radiating pipes or coils above referred to, and as it passes through them and is constantly condensing, the hot water resulting from the condensation is forced from the waste-pipe by the pressure of steam through the opening closed by valve V into the valve-box C, and thence into the apartment T of case A, thus pushing the diaphragm S inward and filling the case. Now if, on the other side of the case A, the actuating agent above named be admitted by lifting valve *h*, it will pass through chambers E and *b* into the case A on the opposite or empty side of the diaphragm, and if the pressure be sufficient it will push the diaphragm back again, and thus force the hot water, previously received into the case, out through passage *a* into valve-box C, and thence beneath valve V', and into the boiler again.

The loaded lever *w* has its fulcrum loosely on the stem P of the valve-trip *e*, and passes through an enlarged slot made vertically through the collar *p*, which is fast on the said stem. Now, as the diaphragm is pressed toward valve-box B by the accumulation of water and force of steam in apartment T, the arm F on the rod D moving outward will carry with it the loaded lever *w*, until the weight W passes a vertical plane, intersecting the axis of stem P, when the weight W will fall to one side and lift the valve *h*, (the valve h^1 being shut,) and thus establish a communication between the apartment T' and the actuating agent.

The force thus brought to act on that side of the diaphragm next the apartment T' will force the diaphragm toward the valve-box C, shut valve V, and open valve V', thus compelling the hot water in apartment T to flow back into the boiler.

When the apartment T is thus emptied and the diaphragm and its rod D have moved the loaded lever *w* past a vertical plane, the weight W will fall to one side and lift the valve h^1, close valve *h*, and thus allow the water in the apartment T to pass off freely through outlet O, while the apartment T is being again filled with hot water.

In this way and by these means the operation goes on automatically and constantly to repeat itself.

The diaphragm S receives on one side hot water and on the other side cold water, consequently, by making this diaphragm a non-conductor of heat, the temperature of the hot water while in the case A will not be materially reduced.

Instead of a flattened case and a flexible diaphragm, as hereinabove described, a cylinder having a piston working in it may be employed, and is considered by me the equivalent of the case and diaphragm.

Having described my invention,

I claim as new and desire to secure by Letters Patent—

1. The non-conducting diaphragm S, or its equivalent, working in a case, A, in combination with inlet and outlet-valves applied to said case on opposite sides of said diaphragm, and operating substantially as described and for the purpose set forth.

2. The combination, with the case A, or its equivalent, of the hot-water valve-box C, containing inlet-valve V and outlet-valve V', and communicating by way of passage *a*, with the hot-water apartment T, substantially as described.

3. In combination with the diaphragm-case A, the receiving and discharging-valve box B, the diaphragm-rod D, and suitable valve-lifting devices, operating automatically on the valves in said box, substantially as described.

4. The non-conducting diaphragm S, made flexible, substantially as described.

JAMES H. BLESSING.

Witnesses:
JOHN BRENNAN,
JNO. W. MCNAMARA.