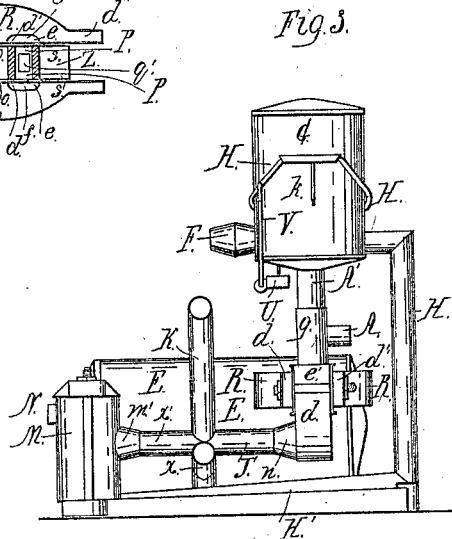
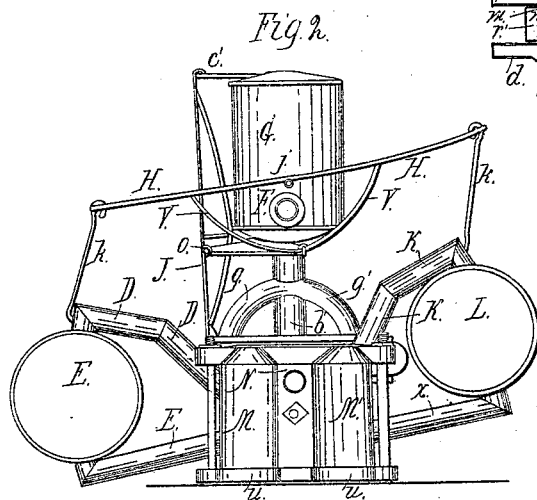
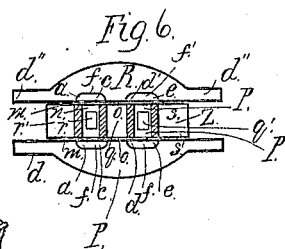
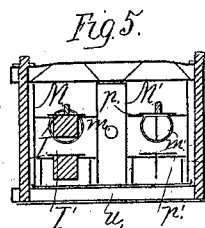
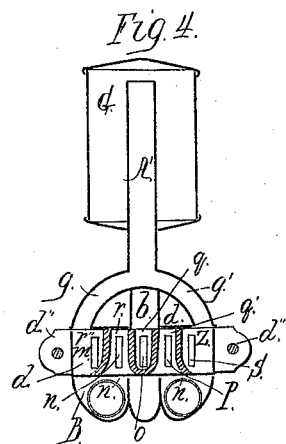
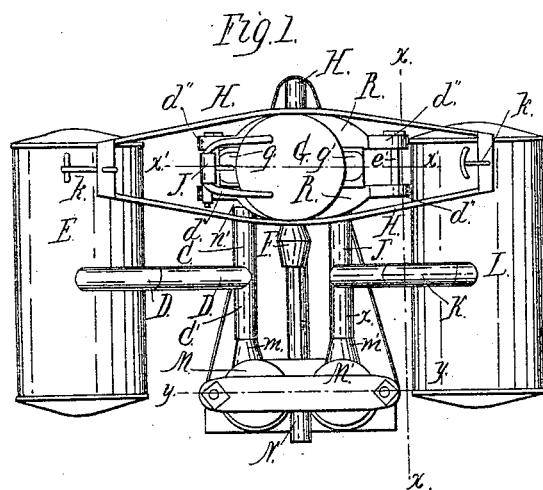


C. H. Prentiss,
Steam-Boiler Water-Feeder,
No. 51,392, Patented Dec. 5, 1865.



Witnesses,
W. H. Furness,
J. Adams.

Inventor,
C. H. Prentiss.

UNITED STATES PATENT OFFICE.

C. H. PRENTISS, OF DETROIT, MICHIGAN, ASSIGNOR TO HIMSELF AND
A. VAN NORMAN, OF SAME PLACE.

IMPROVEMENT IN STEAM-BOILER FEEDERS.

Specification forming part of Letters Patent No. 51,392, dated December 5, 1865.

To all whom it may concern:

Be it known that I, C. H. PRENTISS, of Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Steam-Boiler Feeders; and I do hereby declare that the following is a full and complete description of the construction and operation of the same, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 is a top view of the feeder. Fig. 2 is a side view. Fig. 3 is a sectional end view in the direction of the line, *xx*, in Fig. 1. Fig. 4 is a sectional view in the direction of the line *x' x'*, in Fig. 1. Fig. 5 is a sectional view in the direction of the line, *yy*, in Fig. 1. Fig. 6 is a sectional view across the valves and chest.

Like letters of reference refer to like parts in the different views.

My improvement relates to the construction and operation of a steam-boiler feeder, as hereinafter described.

A, Fig. 3, is the steam-pipe communicating with the boiler that enters a pipe, *b*.

G is a condenser in the inside of which a pipe, A', extends up till near the top, as shown in Fig. 4. The lower end of this pipe branches out on each side into curved pipes *g g'*, that enter a chest, *d*. The pipe *b* that the steam-pipe A enters, is underneath the curved pipes and communicates with the chest *d*. This chest is divided into chambers or divisions *r r' q q' z*. Seen in Figs. 4 and 6. The sides of the chest form valve-seats, in which there are ports or openings *m n O P S*, directly opposite each other.

In the valves R, each side of the chest, are ports *a c d e*. The ports *a c* communicate with each other, and likewise *d e*, as shown in Fig. 6, through the passages *f f'*. These valves are constructed exactly alike, and are of the form shown in Figs. 1 and 6, through the ends *d''*, of which extend rods *e'*, connecting them together on each side of the chest, where they are supported and move on slides or guides and act as balance-valves. They are operated by means of a pendulum, J, hung at *e'* to one side of the condenser that is connected to the valves at the lower end, being attached to the rod *e'* at one end of the valves.

H is a walking-beam that has its bearings

or journals at *j* on the sides of the condenser, to the ends of which are hung connecting-rods *k*, that extend down and are attached at their lower ends to chambers E and L. To the upper part of these chambers are connected pipes D and K, that turn down and enter horizontal pipes C and J', and underneath the chambers E' and X are pipes that communicate with the chambers and pipes C' and X', (shown in Figs. 1 and 2.)

At the junction of where the side pipes, D K and E' X, enter the pipes C C' J' X' there is a division connecting E' with C' and D with C, likewise X with X' and K with J', cutting off direct communication between the ends C' C and J' X' of the pipes C C' J' X'. These pipes at the ends are placed on nozzles *m' n'*, on which they vibrate as the chambers move up and down, the joints being made perfectly steam and water tight. The nozzles *n* enter passage-ways B B' underneath the steam-chest, as shown in Fig. 4, and the nozzles *m'*, enter drums M M', as seen in Fig. 5. In these drums are arranged valves I I' and *p p'*, that are alike in each drum, and in the lower part of the drums there is a passage-way, *u*, that a pipe, H', enters. This pipe extends along underneath the chest *d* and turns up at the end in Fig. 3, and enters the lower part of the condenser.

At one side of the walking-beam there is a curved rod or bar, U, to the middle of which a connecting-rod, U', is attached that is secured to one side, at *v*, of the pendulum, whereby the motion of the walking-beam is communicated to the valves R, operating them in the desired manner.

F is a water-pipe that connects with the well on one side of the condenser, in which there is a check-valve.

N is a water-pipe that communicates with the drums M M', through which water is conveyed into the boiler.

The practical operation of this feeder as constructed, is as follows: The steam from the boiler enters the pipe A, passes down through the pipe *b* into the middle division, *q*, of the chest, from which it passes out at each side through the ports *o* of the valve-seats and ports *d'* of the valves, round through passages *f'*, out at ports *e* of the valves and ports P of the valve-seats into division *q* of the chest, the

valves being moved along so that the ports *o* and *d* and *e* and *P* are directly opposite each other. The steam from the division *q'* of the chest passes down through the passage-way *B'*, along the pipe *C*, up the pipe *D*, into the chamber *E*. At the same time water enters the condenser through the pipe *F* from the well, which passes down and along the pipe *H'* into the passage *u*, up through the valve *p'* in drum *M'*, back through the pipe *X'*, down and along the pipe *X*, up into the chamber *L*, and as the water thus runs into this chamber the weight of the water will cause it to be depressed, which elevates the chamber *E*, and as the chamber *E* rises it causes the steam to discharge through pipes *D C* and passage *B'*, up into the division *q'* of the chest *d*, out at ports *P* in valve-seats, and ports *d* into valves *R*, round through ports *e S* into division *z*, from whence it passes up through curved pipe *g'* and pipe *A'* into the condenser. At the same time steam is passing down into the chest *d* from *A*, through ports *o* in valve-seats, and ports *e* into valves *R*, around in passages *f*, through ports *a* and *m* into division *v'* of the chest, from whence it passes down through passage *B*, along the pipe *J'*, up through pipe *K* into the chamber *L*, producing the same pressure as in the boiler, causing the water from this chamber to pass through the pipe *X*, along the pipe *X'* into the drum *M'*, which enters the drum above the valve *p'*, and it passes up through the valve *p*, out at the pipe *N*, into the boiler. The chamber *L* fills with steam as the air and water are forced out into the boiler. The chambers *E* and *L* rising and falling give a reciprocating movement to the valves *R*, by means of their connection with the pendulum and walking-beam, as before described, whereby the ports are all brought in their proper relative position for receiving and ejecting steam and water, as described.

When the chamber *L* is down it receives steam through the pipe *A*, valves *R*, connecting-pipes *J'* and *K*, forcing out the air and water that may be therein through the pipes *X X'*, and the upper valve *p*, through the pipe

N, into the boiler. Then, as *L* rises, the steam therefrom passes into the condenser *G*, through the pipes *K J'*, and valves *R*, in a similar manner, as described, for the passage of steam from the chamber *D*, into the condenser, and as the steam passes out a vacuum is formed, which is then filled from the well through the check-valve in pipe *F*, first filling *G*, and then passing down and along the pipe *H'*, through the lower valve, *p'* and pipes *X X'*, into chamber *L*. While the water is thus passing into *B* and *L* steam is passing into the chamber *E* through pipe *A*, valves *R*, passage *B'*, and pipes *C D*, as before described, that is then raised by the weight of water in *L*, which, by its connection with the valves *R*, moves them so as to discharge steam from *E* into *G*, through pipes *D C* and passage *B'*, in the manner before described, which steam is condensed by water in the condenser, and also in *E*, by water passing from *G* into *E* from the well through the passages before mentioned. There is no communication between the pipe *A* and pipes *g*, *g'*, and *A'* leading into *G*.

When steam is passing into *L*, water is passing into *E*, in a similar manner as described for the passage of water into *L*, the valves *I I'* and *p p'* in the drums and the pipes on each side being constructed and operating alike.

What I claim as my improvement, and desire to secure by Letters Patent, is—

1. The valves *R* and chest *d*, when arranged and connected together on each side of the chest, and operated conjointly, as set forth.
2. The combination of oscillating chambers *E L* with the condenser *G* and valve-drums *M M'*, when arranged and operating substantially as set forth.
3. The combination of the beam *H*, pendulum *J*, and connecting-rod *V'*, in combination with the valves *R*, and chambers *E L*, as and for the purpose specified.

C. H. PRENTISS.

Witnesses:

W. H. BURRIDGE,
A. W. McCLELLAND.