No. 632,937. Patented Sept. 12, 1899.

E. E. GOLD.

STEAM TRAP.

(Application filed July 7, 1899.)

(No Model.)

FIG. 1.

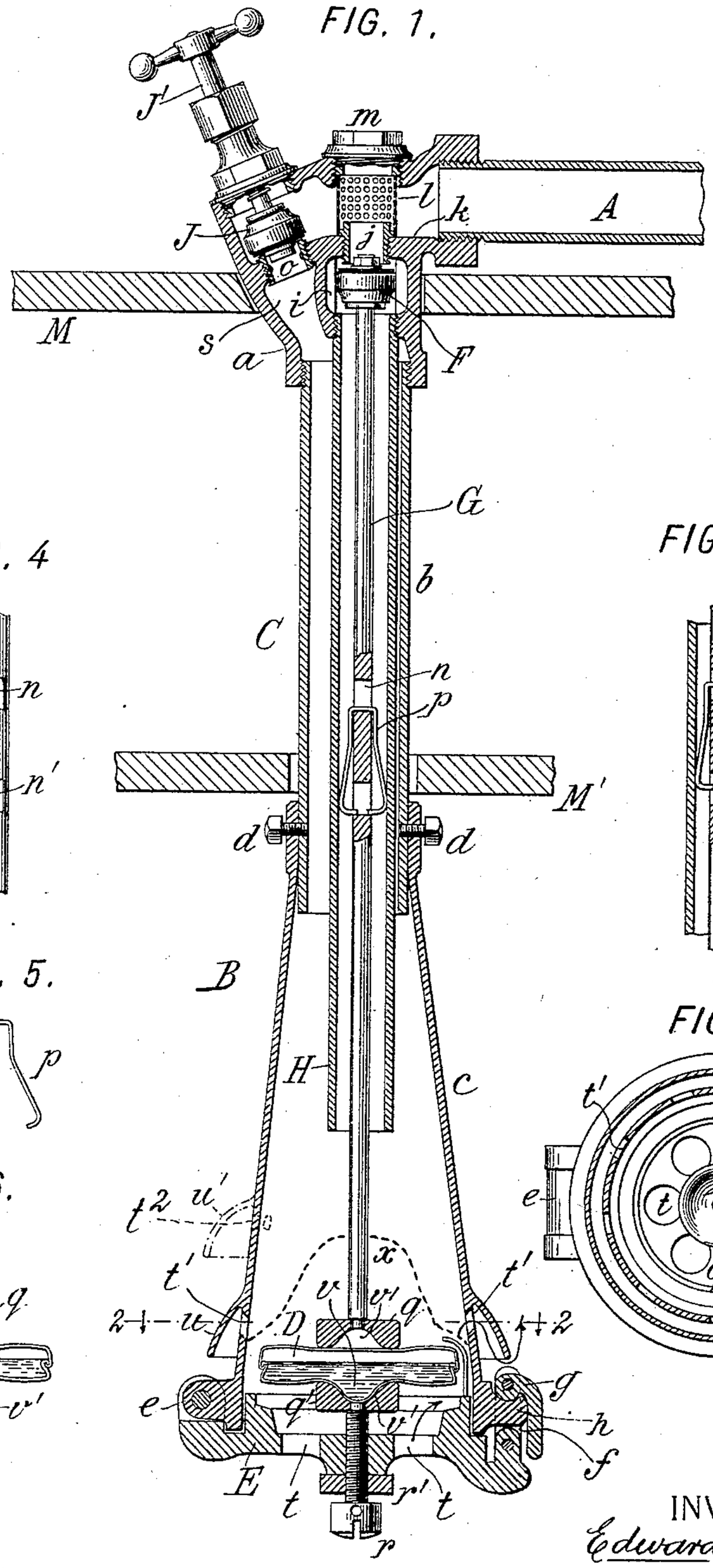


FIG. 4

FIG. 5.

FIG. 6.

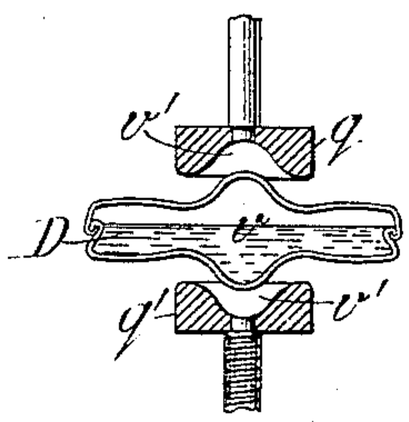


FIG. 3.

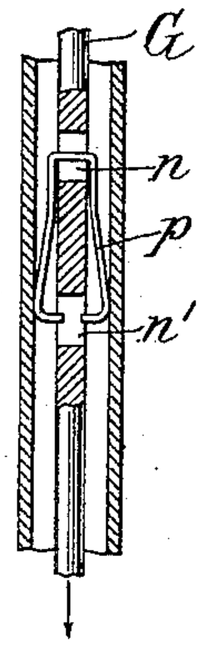
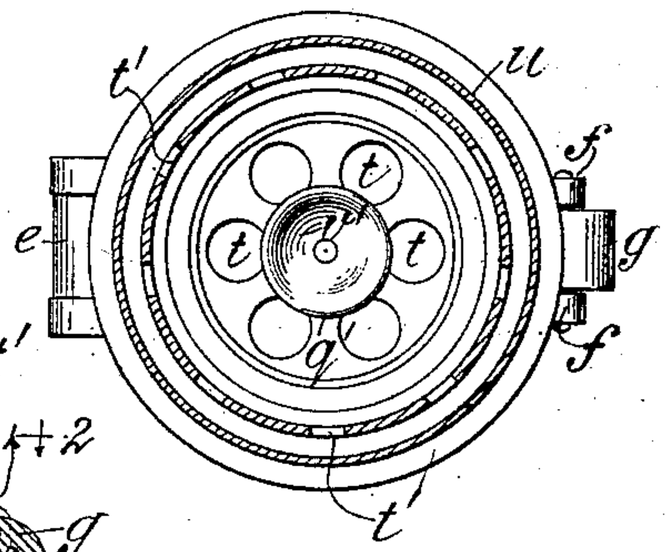


FIG. 2.



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UNITED STATES PATENT OFFICE.

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STEAM-TRAP.

SPECIFICATION forming part of Letters Patent No. 632,937, dated September 12, 1899.

Application filed July 7, 1899. Serial No. 723,109. (No model.)

To all whom it may concern:

Be it known that I, EDWARD E. GOLD, a citizen of the United States, residing in the city, county, and State of New York, have invented certain new and useful Improvements in Steam-Traps, of which the following is a specification.

This invention relates to steam-traps, and particularly to such as operate on the thermostatic principle, my improved trap being particularly adapted for use in connection with the steam-heating systems of railway-cars, although adapted to other uses.

My invention pertains generally to upright or elongated traps, wherein the thermostat or expansion device is located at the lower part of the trap, and the valve which is operated thereby closes against a seat which is arranged at the upper part of the trap. In traps of this kind the automatically-operated valve may be arranged within or close to the interior of the car or other chamber or space to be heated, while the expansion device may be placed below or outside of the car or other space, where it is exposed to the cold outer air.

I will now proceed to describe the preferred form of my invention, with reference to the accompanying drawings, wherein—

Figure 1 is a vertical mid-section of my improved trap, showing it applied to a steam-heating pipe and passing through the floor of a railway-car. Fig. 2 is a horizontal section thereof on the line 2 2 in Fig. 1. Fig. 3 is a sectional elevation of a fragment of Fig. 1. Fig. 4 shows a fragment of the operating-rod of Fig. 1. Fig. 5 shows the guide-spring of Fig. 1 detached, and Fig. 6 is a mid-section of one form of thermostat or expansion vessel.

Referring to the drawings, let A in Fig. 1 designate a steam-pipe or drainage-pipe from a steam-radiator or any conduit leading from the steam heating apparatus or other device to be drained of condensation by the trap.

B is the trap as a whole. In the construction shown the outer shell C of the trap is formed with three parts or sections, of which the upper one *a* is a shell, which may be conveniently cast and which contains the valves and to which the end of the pipe A is screwed or otherwise united. The intermediate section *b* of the shell is in the form of a tube or sleeve and may conveniently be made of a section of wrought-metal pipe screwed or otherwise united at its upper end to the lower part of the shell *a*. The third and lower section *c* of the shell of the trap is of conical, flaring, or trumpet shape, being united at its upper end to the lower part of the tubular shell *b*, which may conveniently be effected by means of set-screws *d d*, as shown, while its enlarged lower portion serves as a chamber for inclosing a thermostat or expansion vessel D. The trumpet-shell *c* is best made of cast metal, and it has hinged or otherwise united to its lower end a cap or end plate E. This cap in the construction shown is provided at one side with a hinge *e*, by which it is united to the lower end of the shell *c*, while at its opposite side it has a fastening device comprising a pair of links *f f*, which couple to it a locking-arm *g*, the pivotal portion or hub of which is eccentric and locks against a projection *h*, formed on the exterior of the shell *c*. To lock the cap, it is only necessary to swing it up into place, and throwing upwardly the handle of the locking-arm *g* swing its hub over the projection *h* and then turn down the locking-arm, so that its hub shall wedge itself by an eccentric oscillatory movement against the curved upper face of the projection *h*.

The working parts of the trap comprise an automatic valve F, the expansion vessel D, and an intermediate connecting-rod G. The valve F works between guiding-ribs formed in a cavity or chamber *i* in the shell *a* and its upper or seating face seats against a seat *j*, formed, preferably, as a tube or thimble screwed through a threaded hole in a diaphragm *k*, formed within the shell *a*. This tubular thimble projects above the diaphragm *k*, and it is inclosed by a tubular sieve or strainer *l*, which is held in place by a cap *m*. This cap closes a threaded opening, through which when the cap is removed the parts *j l* may be inserted. Beneath the valve F the chamber *i* is continued downward by means of a tube H, which may be a pipe screwed into the shell *a*, as shown. This tube extends entirely through the shell *b* and well into the shell *c*, as shown. Its functions are, first, to form a conduit for the drainage water and steam which escape through the trap when the valve F is opened and direct

them down into the enlarged lower portion of the trap and onto the expansion vessel D, and also to provide a guide for the rod G. For the latter function I provide the rod G with any suitable projections adapted to engage the inner walls of the tube H in order to hold the rod G properly centered therein while permitting its free up-and-down movement. Heretofore it has been proposed to guide the rod G at its lower end either by fastening it to the vessel D, which is undesirable, or by providing guiding means at its lower end, which is open to the objection that the outlet-passage for discharge of the drainage water and steam is obstructed and the water is liable in very cold weather to freeze at this obstructed outlet and render the trap inoperative. These results I avoid by locating the guide well up within the tube H, where by reason of the heating of this tube by the escape of water and steam it is free from liability of freezing. If any ice is formed in the operation of the trap, it will accumulate approximately where indicated by the dotted line *x* in Fig. 1, being caused by the drip from the trap which falls from the lower end of the tube H. The form of guide which I prefer is that shown, the rod G being formed, as shown in Fig. 4, with two transverse slots *n n'*, and a stiff spring *p*, bent approximately to the shape shown in Fig. 5, being passed through the upper slot, and as the rod is pushed up into place within the tube being closed together in the manner shown in Fig. 1, with its free ends entering into the lower slot, as there shown. The legs of this spring thus bear outwardly with considerable pressure against the inner surfaces of the tube H, and the spring consequently becomes a frictionally-held guide having a loose connection with the rod G, so that the latter may move up and down against the spring, its slots *n n'* being of a length exceeding its greatest movement. Fig. 1 shows the position of the spring when first pushed into place by the rod, and Fig. 3 shows what may be taken as the normal condition of the guide during movement of the rod.

The lower end of the rod is fitted on a disk *q*, which rests on the top of the expansion vessel B. This vessel is supported on a similar disk *q'*, which is seated on the upper end of the usual adjusting-screw *r*, which screw turns in a threaded hole in the lower cap E and is locked in place by a lock-nut *r'*, as usual.

In the shell *a* I provide a blow-off valve J, as heretofore, this valve being arranged, preferably, above and seating downwardly against a seat or thimble *o*, passing through the same partition *k* which divides the shell, but communicating beneath this partition with a separate conduit *s*, which communicates with the interior of the shell *b*—that is to say, with the space within this shell and outside the tube H. The valve J is operated a by screw-stem J', passing out through a stuffing-box and having a handle at its outer end in the usual manner, and it may be arranged at an angle, as shown, or otherwise, as may be preferred. The valve J is for the purpose of blowing off water or steam, when desired, independently of the trap proper. One important use for this blow-off is to thaw out the lower part of the trap in case it should freeze up. Such freezing is liable to occur, as before stated, by water dripping from the tube H, in which case the ice forms approximately as indicated by the dotted line *x*. Such accumulated ice obstructs the proper action of the expansion vessel D and must be removed in order to restore the trap to normal operation. For this purpose the blow-off is opened and steam or hot water is caused to blow out through the trap, passing down through the space between the shell and the inner tube H and blowing against the ice which clogs the lower part of the trap, which consequently is quickly melted. Heretofore this blow-off has directed steam either down through the same conduit through which the water or steam from the valve F passed or else through an outer tube surrounding the entire trap-casing. In the former case the clogging of this outlet-passage from the automatically-operated valve F would also clog the outlet from the blow-off, since both followed the same passage. In the latter case, since the outlet from the blow-off is exterior to the valve-casing, the steam which is blown off cannot act directly upon the ice which clogs the thermostat, but can act only by first warming the casing and transmitting the heat through the latter to melt the ice. In either case the blow-off is less effective for the purpose of thawing out the trap than by the construction provided by my present invention, where the blow-off is directed inside the main casing C of the trap, while at the same time it is distinct from the passage within the tube H, which conveys the outflowing water or steam from the trap-valve F.

I apply to the present form of trap means for ventilation operating on the same principle as those claimed in my Letters Patent No. 507,268, dated October 24, 1893. I form inlet ventilating-openings *t t* at the bottom of the trap and preferably in the lower cap E, as shown, and I form upper ventilating-openings *t' t'* in the flaring section *c* of the shell above the expansion vessel D. These openings permit the circulation of air through the lower part of the cap and around the expansion vessel, the air entering at the lower openings *t* flowing around the vessel and passing out through the upper openings *t'*, as indicated by the arrows, or when the trap is applied to a railway-car which is in motion the draft may cause a circulation inward through the openings *t'* on one side and outward through the like openings on the other side. When the expansion vessel is obstructed by ice, as already explained, the openings *t'* serve as an exit for steam admitted through the blow-off valve, so that even

if the ice fills the entire space around the expansion vessel the circulation of the steam is not blocked. In order to prevent the steam which blows out through the openings t' from blowing out laterally, and thereby possibly scalding or injuring bystanders, or, perhaps, trainmen working beneath the car, I provide a deflector or hood u outside of the openings, which is adapted to deflect the outpouring steam and direct it downwardly. To provide for the possible contingency that ice might form within the trap-casing so high as to obstruct some or all of the holes t', I may provide one or more holes t^2 at a higher level, through which the steam can blow out in such case until the ice below is melted. Such upper hole or holes should be hooded in like manner by a hood, such as u', shown in dotted lines.

The thermo-expansion vessel D is ordinarily made of the form shown in Fig. 1, having a downward projection v at its center on its under side. This projection is received into a hollow or depression g' in the upper side of the disk q', by which the vessel D is centered. It sometimes occurs that railway operatives will place the expansion vessel in the trap wrong side up, thereby bringing the central projection v on the upper side of the vessel. To provide for this contingency, I form the upper disk q with a similar central recess v', which is adapted to receive and center the projection on the vessel; or it is within my invention to form the vessel D with projections v on both upper and lower sides, as shown in Fig. 6.

My invention is not necessarily limited to all the details of construction herein set forth, since my invention is susceptible of a considerable degree of modification without departing from its essential features. For example, I do not limit myself to the construction of the trap-casing C in three parts $a\ b\ c$, as described, since it might be otherwise constructed, nor is the inner tube H necessarily of exactly the arrangement shown, since instead of being located eccentrically, as shown, it might be concentric with the outer shell, and it might extend into the enlarged lower portion of the shell to a greater distance than shown or to a less distance without materially altering its function. I prefer, however, the construction and proportions shown, believing the trap thus constructed to be best adapted to the requirements of practice.

It will be understood that in Fig. 1 M designates the floor of the car, and M' the sheathing applied beneath the floor-framing of the car. It is to adapt the trap for application to a car thus sheathed that I preferably construct the shell C in sections, as described. In applying the trap to the car the shell a is applied from above the floor M, while the shell c is applied from beneath the sheathing M'. The parts may be severed at the joints between the section b and either the upper or lower section, as may be most convenient, but preferably at the lower joint, since the set-screws d afford the most convenient method of connecting the parts. Thus the parts a, b, H, F, and G will be applied from above, while the parts c and E will be fitted from beneath, and after being joined at d the expansion vessel D will be put in place and proper adjustment made.

I claim as my invention the following-defined novel features, substantially as hereinbefore specified, namely:

1. A steam-trap comprising a casing, an automatically-operated valve therein, and a hand-operated valve, said casing having within it separate conduits for conducting the discharge from both valves through the casing, said conduits uniting at the discharge end of the casing.

2. A steam-trap comprising a casing, an automatically-operated valve, a hand-operated valve and a thermostatic device for operating the former valve, said casing having a chamber inclosing said thermostatic device, and having within it separate conduits for conducting the discharge from both said valves to such chamber.

3. A steam-trap comprising an elongated casing, an automatically-operated valve and a hand-operated valve-seating within said casing near one end thereof, a thermostatic device located within said casing near the opposite end thereof and connected to operate said automatically-operated valve, said casing having within it separate conduits for conducting the discharge from both valves into proximity to said thermostatic device.

4. A steam-trap comprising an elongated casing C, valves F and J having seats therein, a thermostatic device therein connected to operate the valve F, the valve J adapted to discharge directly into said casing, and an internal tube H arranged to receive the discharge from said valve F.

5. A steam-trap comprising a casing, a thermostatically-operated valve and a hand-operated blow-off valve, said casing formed with opposite openings adapted to admit the flow of a current of air to ventilate the thermostatic device and adapted also, when said device is clogged by ice, to permit the exit of steam from the blow-off valve.

6. A steam-trap comprising an elongated casing enlarged at its lower end to form a chamber, a thermo-expansion vessel mounted in said chamber, a valve in said casing operated from said vessel, and a blow-off valve, said casing formed with ventilating-openings on opposite sides of said vessel adapted to admit a current of air to circulate across said vessel, and adapted also to permit steam from said blow-off valve to blow out from the casing when the latter is choked by accumulated ice.

7. A steam-trap comprising an elongated casing enlarged at its lower portion to form a chamber, a thermostatic vessel mounted in

said chamber, a valve-seating in the upper part of said casing, a rod passing through said casing to connect said vessel and valve, said casing formed with openings for admitting air beneath said vessel and with air-exit openings in the sides of said enlarged portion adjacent to said vessel and around the lower portion of said rod, adapted to serve as a steam-outlet in case the lower portion of the casing is obstructed by ice.

8. A steam-trap comprising an elongated casing, a valve-seating at the upper part of said casing, a thermo-expansion vessel mounted in the lower part of said casing, a rod connecting said valve and vessel extending through a tubular portion of said casing, and guides for said rod engaging said tubular portion, comprising a spring *p* coacting with the inner surface of said tubular portion and with slots in said rod, to the effect set forth.

9. A steam-trap comprising a casing, a valve therein, a thermo-expansion vessel having a central projection, disks *q* and *q'* arranged on opposite sides of said vessel and each formed with a central depression adapted to receive said central projection thereon, and a rod connecting the upper of said disks with said valve.

10. A steam-trap comprising a casing, a valve therein, a thermo-expansion vessel having central projections *v* on its opposite sides, disks *q* and *q'* arranged on opposite sides of said vessel and each formed with a central depression adapted to receive said central projections thereon, and a rod connecting the upper of said disks with said valve.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

EDWARD E. GOLD.

Witnesses:
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FRED WHITE.