

(No Model.)

2 Sheets—Sheet 1.

C. J. MELLIN.
STEAM SEPARATOR.

No. 520,604.

Patented May 29, 1894.

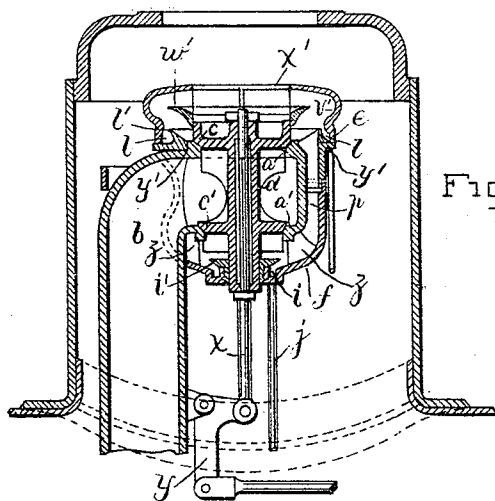


Fig. 1.

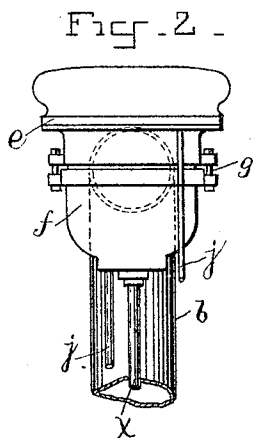


Fig. 2.

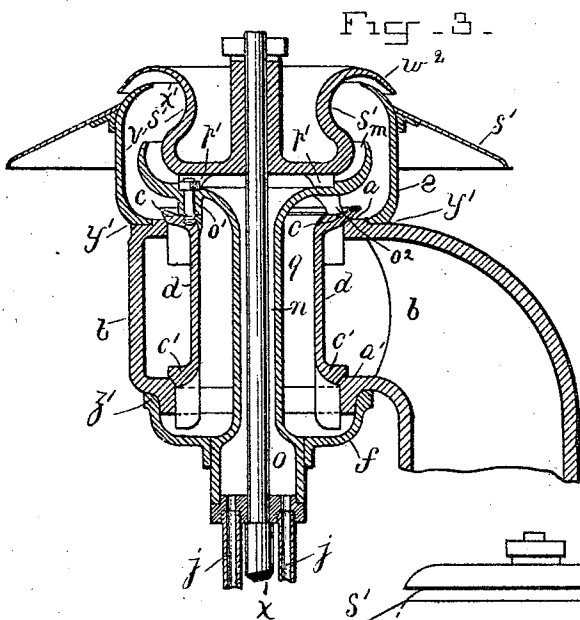


Fig. 3.

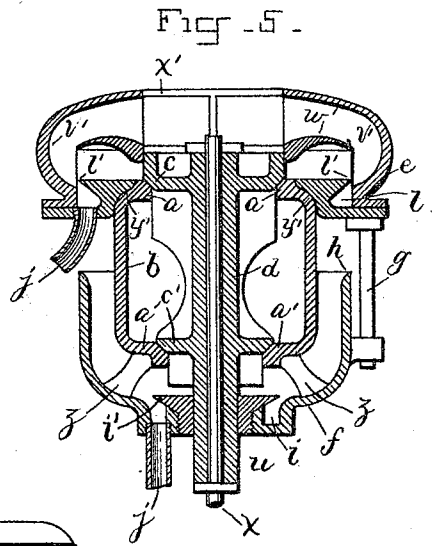


Fig. 5.

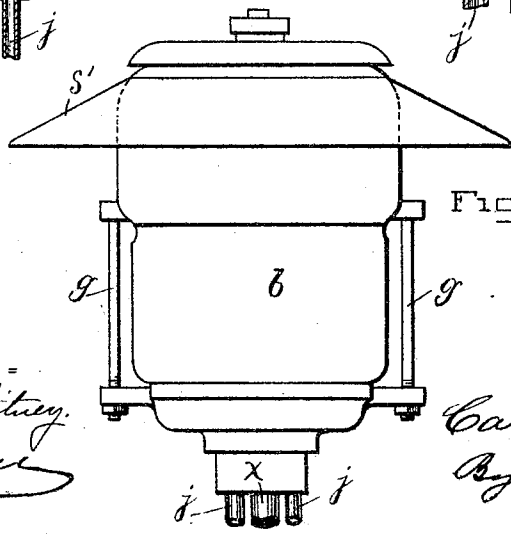


Fig. 4.

WITNESSES =
Clinton E. Whitney.
Chas. Morgan

INVENTOR =
Carl J. Mellin
By A. P. Shayer
att'y.

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Fig. 6.

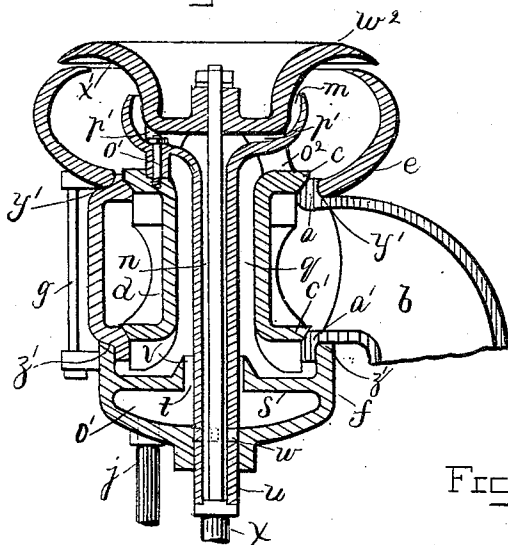


Fig. 9.

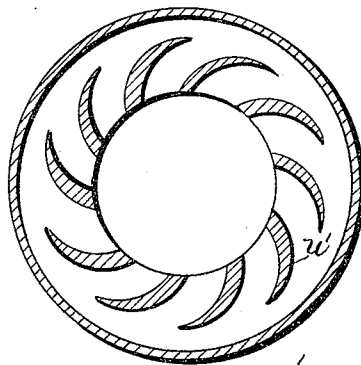


Fig. 10.

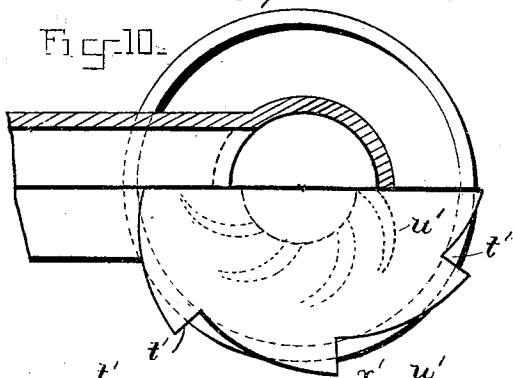


Fig. 7.

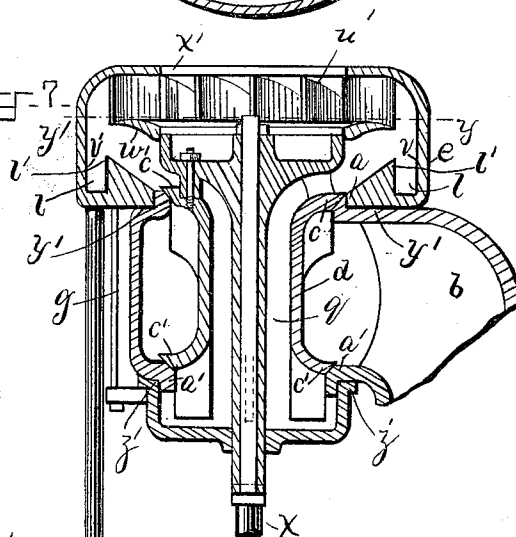


Fig. 8.

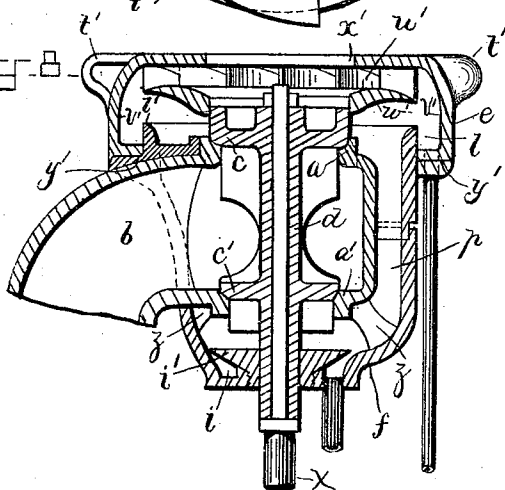
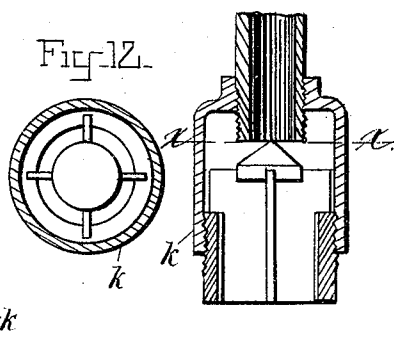


Fig. 11.

Fig. 12.



WITNESSES.

Chas. H. Morgan
Ernst Sundgren

INVENTOR.

Carl J. Mellin
Ry. A. Thayer atty

UNITED STATES PATENT OFFICE.

CARL JOHAN MELLIN, OF RICHMOND, VIRGINIA.

STEAM-SEPARATOR.

SPECIFICATION forming part of Letters Patent No. 520,604, dated May 29, 1894.

Application filed August 10, 1892. Serial No. 442,734. (No model.)

To all whom it may concern:

Be it known that I, CARL JOHAN MELLIN, a subject of the King of Sweden and Norway, and a resident of Richmond, in the county of Henrico and State of Virginia, have invented certain new and useful Improvements in Steam-Separators, of which the following is a specification.

My invention relates to steam separators for use in locomotive boilers and consists in the improved constructions and arrangements of apparatus in connection with vertical balanced valves hereinafter described for facilitating the separating of the water from the steam escaping through the valve reference being made to the accompanying drawings, in which—

Figure 1, is a sectional elevation of the valve and separating appliances in one of the modes of construction which I propose, the steam dome of the boiler is also represented in sectional elevation in this figure. Fig. 2, is a side elevation of the valve and separator appliances of Fig. 1, in a view at right angles to that of Fig. 1. Fig. 3, is a sectional elevation of the valve and separator appliances, with some modifications. Fig. 4, is a side elevation of the valve and separator appliances of Fig. 3, in a view at right angles to that of said figure. Fig. 5, is a sectional elevation of the valve and separator appliances with other modifications. Figs. 6, 7, and 8, are also sectional elevations showing modifications. Fig. 9, is a horizontal section of Fig. 7 on line *y y*. Fig. 10 is partly a plan view and partly a horizontal section of the valve and separator appliances of Fig. 8. Figs. 11 and 12, are respectively vertical and horizontal sections of a check valve in the waste pipe as in Fig. 7, for the escape of the separated water, to prevent suction of the steam into the separator through the waste pipe.

a represents the upper and *a'*, the lower valve seats surrounding the openings of the valve, admitting steam into the pipe *b*.

c represents the upper and *c'*, the lower disks of the valve for closing said openings, these parts and their body or connecting part *d*, being hereinafter called the valve.

To each valve opening there is a separating cup, as cup *e*, to the upper opening, and cup *f*, to the lower opening through which the

steam enters and in which the water is separated, said cups and other separating appliances being represented in various modifications in the different figures. The cups are clamped to the upper and lower sides of the steam pipe *b*, surrounding the steam openings into it by the bolts *g*. In Fig. 5 steam enters the lower cup *f*, at *h*, independently of the upper cup and is separated from the water therein through the receptacle *i*, into which the water projects or falls away from the steam and is trapped by the disk *i'*, and thence escapes by the waste pipe *j*, which is to be extended into the water sufficiently below the steam space to prevent steam rising in it, and will in some cases have a check valve as *k*, Figs. 7, 11 and 12, for more effectually preventing the steam from passing upward which would hinder the escape of the water, particularly before sufficient water is collected in the separator to prevent such return. In the rest of the figures the arrangements are such that steam enters the upper cup for both valve openings and is therein separated from the water by the receptacle *l* or *m*, into which it is deflected and from which it escapes through another waste pipe *j*, or through the valve having the center passage *n*, to chamber *o*, or *o'*, and thence by one or more waste pipes *j*, and part of the steam passes down to the lower opening either in the cups which are made to connect with each other and form a passage *p* for the steam partly surrounding the end of pipe *b*, as in Figs. 1 and 8, or through a passage *q*, in the body of the valve as in Figs. 3, 6 and 7. In Figs. 1, 6 and 8 the lower cup is provided with separators for again separating the water, but they may be omitted as in Figs. 3 and 7 if preferred; the separators in the lower cups of Figs. 1 and 8, are the same as that of Fig. 5, previously described, but in Fig. 6, the cup has a false bottom *s*, through which is a central passage *t*, down which the water flows along the surface of the valve stem *u*, passing through it into chamber *o'*, the steam being deflected therefrom by the flange *v*, said chamber *o'*, also having a waste pipe *j*, and the stem *u* of the valve having the center passage *n*, for the escape of the water separated in receptacle *m*, is also provided with lateral passages *w*, for the escape of the water into chamber *o'*. The valve stem *u*,

extends through the bottom of the cup and receives the rod x , connecting it with the bell crank lever y , by which it is worked. In those cases in which the steam enters the lower opening through the cup or cups, the lower cups are of larger diameter and the lower one is fitted with ribs z , bearing against the pipe b to seat the cup thereon; but in the other cases the lower cup has its upper edge bearing against the pipe as at z' Figs. 3, 6 and 7.

In the arrangements of Figs. 3, 6 and 7 for the passage of the steam to the lower valve opening through the valve, the valve openings and valve are necessarily somewhat larger in diameter than in the other way to provide space for such passage.

The cup e , is seated on the top of the pipe b , at y' , and has a central opening x' , through the top admitting the steam onto the outwardly deflecting plate w' , which by directing the steam against the downwardly curved inner surface v' , of the cup causes the water to be projected into the receptacle l , while the steam passes into the valve from which the water is excluded by the flange l' , this operation being facilitated by the curved guide chutes w' , projecting downward from the top of the cup e inside, which it may sometimes be preferred to use for imparting spiral motion of the steam and causing centrifugal action of the water more effectually depositing it in the receptacle l , to which may also be added the lateral spiral inlets l' , through the side of the cup below the top when desired for greater spiral action of the steam. But with the receptacle m before described for the separated water another form of deflector consisting of the cup shaped device w^2 , may be used, the top of which extends up through the opening x' , in the top of the cup e , and is flared outwardly over the top of the cup, with the re-entering curved shape at s' , adapted to project the water into the receptacle m , while the steam passes over the upper edge of said receptacle to the upper opening of the valve and to the passage q , tending to the lower opening. The deflector w^2 , is a fixed part of the cup e and is bored centrally at q , and the upper disk of the valve works up and down in said bore as a piston preventing the steam from passing that way to the valve. The cup w^2 , is seated on ribs p' , in the receptacle m , and said receptacle is seated by lugs o' , and ribs o^2 , on and is bolted to the upper valve disk, and they move together with the valve.

In Figs. 3 and 4, I represent a conic plate s' , attached to the upper cup e , near the top and sloping downward outwardly which constitutes a water shed on which much steam will impinge when flowing into the valve and much water will collect and flow back into the steam space below, this is more particularly useful in connection with the deflecting cup w^2 , flaring over the top of cup e , which causes the inflow of the steam along the surface of said water shed. The waste pipes j ,

may have any approved form of automatic injector or ejector attached for drawing off the separated water, for example such as described in my former patent, No. 424,013, granted March 25, 1890.

I claim—

1. The combination with a vertical valve having upper and lower openings, of a duplex steam separator inclosing both upper and lower openings, with independent separating devices to each opening substantially as described.

2. The combination with a vertical valve having upper and lower openings, of a steam separator consisting essentially of the upper and lower cups clamped on the steam pipe, and inclosing the valve openings, one or more receptacles therein of the water deflected out of the course of the steam ways to the valve openings, and the escape pipe or pipes connected therewith substantially as described.

3. The combination with a vertical valve having upper and lower openings, of a steam separator consisting essentially of the upper and lower cups clamped on the steam pipes and inclosing the valve openings, a passage conducting the steam from the upper cup into the lower one for the lower valve opening, and one or more receptacles therein, of the water deflected out of the steam ways to the valve openings and the escape pipe or pipes connected therewith.

4. The combination with a vertical valve having upper and lower openings, of a steam separator consisting essentially of the upper and lower cups clamped on the steam pipe and inclosing the valve openings, a passage through the valve conducting the steam from the upper cup into the lower one for the lower valve opening, and one or more receptacles therein of the water deflected out of the steam ways to the valve openings, and the escape pipe or pipes connected therewith substantially as described.

5. The combination with a vertical valve having upper and lower openings, of the cup inclosing the upper opening and admitting the steam through the hole in the top to the upper end of the valve, and the deflecting plate above the steam ways to the valve opening, said plate and the valve adapted for the rise of the valve without hinderance by the said plate substantially as described.

6. The combination with a vertical valve having upper and lower openings, of a steam separator consisting essentially of the upper and lower cups clamped on the steam pipe and inclosing the valve openings, a passage through the valve for the escape of the separated water, the cup shaped deflector flared over the top of the separator cup, and the water receptacle at the base of the same and discharging through the valve substantially as described.

7. The combination with the vertical valve having upper and lower openings, of the steam separator consisting essentially of the

upper and lower cups clamped on the steam
pipe and inclosing the valve openings, the
valve having an opening through it for the
steam to the lower opening, the water recep-
5 tacle mounted on and fastened to the top of
the valve, and having the water passage
through the steam passage of the valve, and
the cup deflector mounted on the water re-
ceptacle said valve attached to the valve stem
10 by the cup deflector and water receptacle sub-
stantially as described.

8. The combination of the conic water col-

lecting shed with the inlet passage for the
steam to the valve, and the cup deflector
flared over the top of the said inlet substan- 15
tially as described.

Signed at Richmond, in the county of Hen-
rico and State of Virginia, this 9th day of
January, A. D. 1892.

CARL JOHAN MELLIN.

Witnesses:

J. M. PICKRELL,
WM. H. TAYLOR.