F. J. COLE & S. HOFFMANN.

STEAM COLLECTOR FOR SUPERHEATERS.

APPLICATION FILED APR. 8, 1911.

1,054,676.

Patented Mar. 4, 1913.

2 SHEETS—SHEET 1.

Fig. 2.

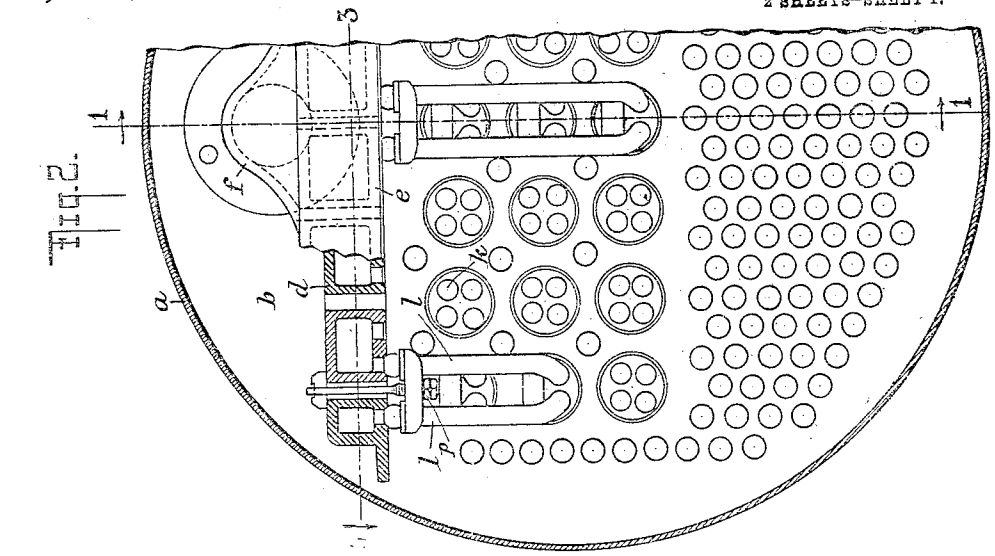
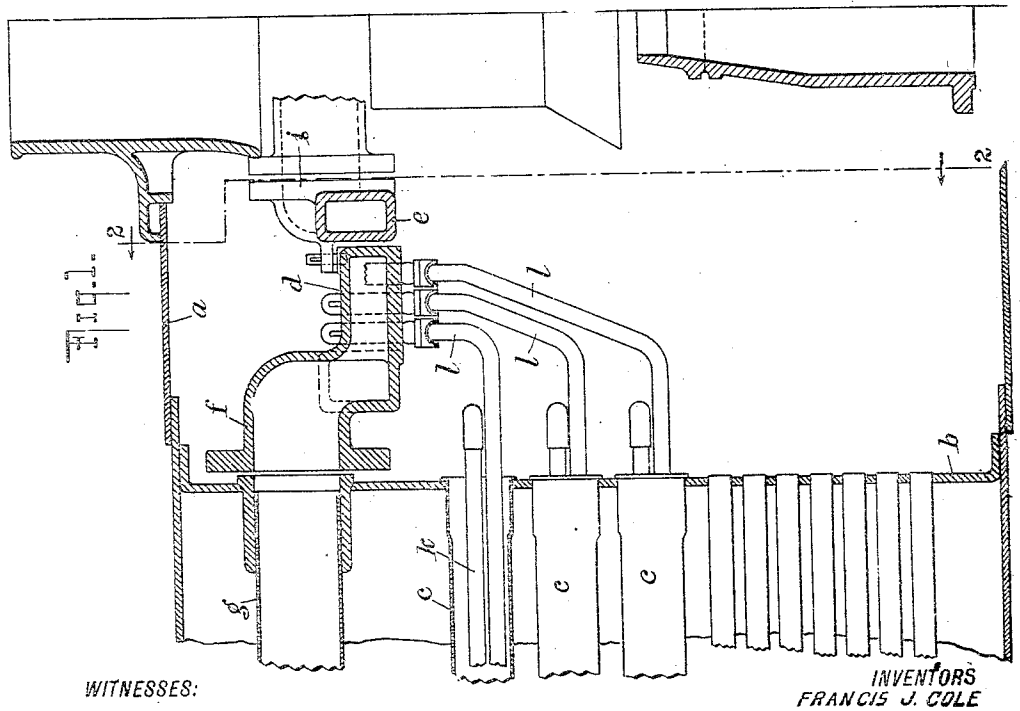


Fig. 1.



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2 SHEETS—SHEET 2.

Fig. 8.

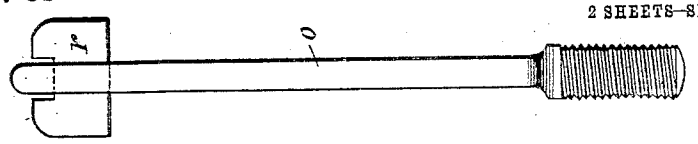


Fig. 7.

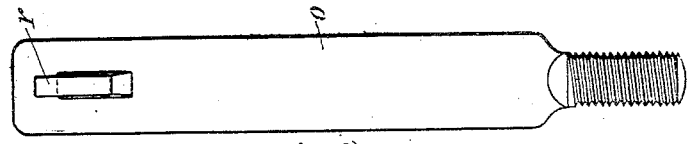


Fig. 5.

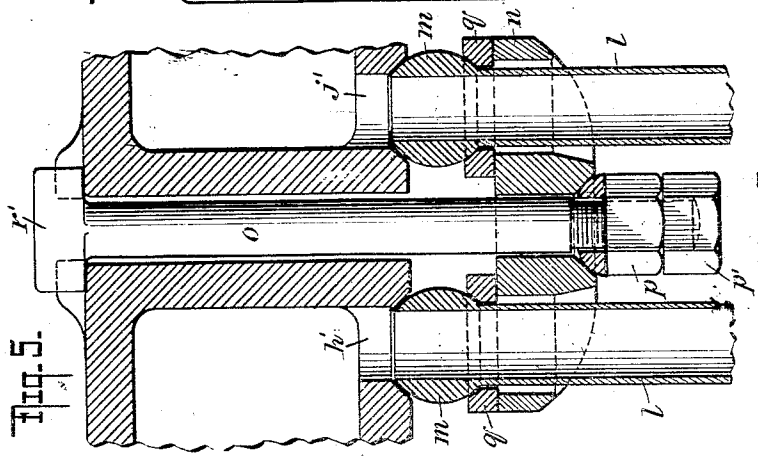


Fig. 6.

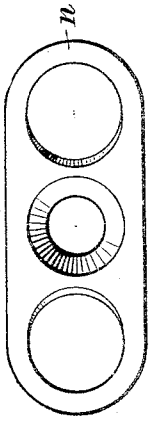


Fig. 3.

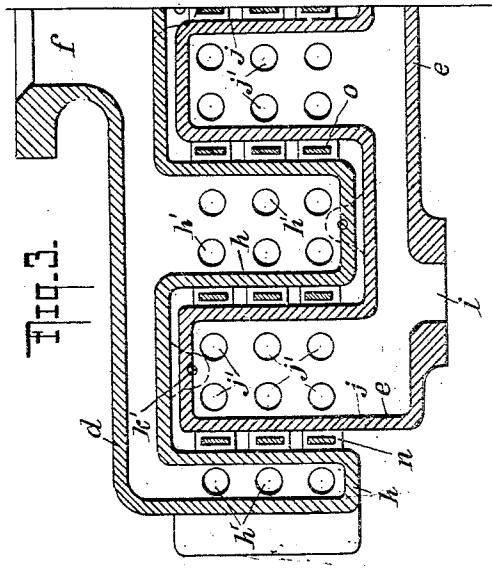
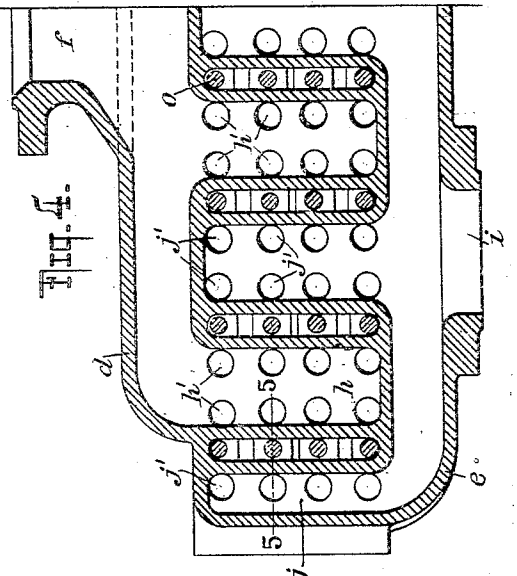


Fig. 4.



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UNITED STATES PATENT OFFICE.

FRANCIS J. COLE, OF SCHENECTADY, AND SIMON HOFFMANN, OF NEW YORK, N. Y., ASSIGNORS TO LOCOMOTIVE SUPERHEATER CO., OF NEW YORK, N. Y., A CORPORATION OF NEW JERSEY.

STEAM-COLLECTOR FOR SUPERHEATERS.

1,054,676. Specification of Letters Patent. **Patented Mar. 4, 1913.**

Application filed April 8, 1911. Serial No. 619,651.

To all whom it may concern:

Be it known that we, FRANCIS J. COLE, a citizen of the United States, and resident of Schenectady, Schenectady county, State of New York, and SIMON HOFFMANN, a subject of the Emperor of Austria-Hungary, and resident of New York, county and State of New York, have invented certain new and useful Improvements in Steam-Collectors for Superheaters, of which the following is a specification.

Our invention relates to steam collectors for superheaters and particularly to steam collectors for use with locomotive superheaters of the type comprising superheating tubes or loops arranged in boiler flues (fire tubes), and has for its object to provide an arrangement of steam collectors embodying peculiar advantages as to convenient and economical construction, assembly in the locomotive, compactness, and facility of attachment thereto or removal therefrom of the superheater tubes.

A further object of our invention is to provide an arrangement such that the superheater tubes as they lie in their smoke tubes may be easily inspected or cleaned or may be easily removed individually for repairs or replacement.

A still further object of our invention is to provide a steam collector combining with the foregoing advantages the further advantage of keeping the superheated steam header or chamber and the saturated steam header well separated, so as to avoid heat exchange between them, without loss of compactness.

Our invention will be better understood by reference to the accompanying drawings in which—

Figure 1 represents a central longitudinal section of one form of the invention, being taken along the line 1—1 of Fig. 2, and part being broken away; Fig. 2 represents a transverse section partly broken away taken substantially along the line 2—2 of Fig. 1; Fig. 3 represents a horizontal section, considerably enlarged, taken along the line 3—3 of Fig. 2; Fig. 4 represents a section, similar to that of Fig. 3, showing a modified form of our invention; Fig. 5 is a section, still further enlarged, through adjacent header branches of the steam collector of Fig. 4 along the line of one of the connector bolts used for attaching the superheater tubes to the steam collector; Fig. 6 is a plan view of the connecting clamp through which the connector bolt unites the ends of a superheater unit to the steam collector; and Figs. 7 and 8 are views, in front and side elevation respectively, of the form of connector bolt employed when the first form of our invention, as shown in Figs. 1–3, is in question.

Referring to Figs. 1 to 3, *a* is the smoke box shell, *b* the front tube sheet, *c* the boiler flues and *d* and *e* steam headers arranged horizontally, one in front of the other, in the upper part of the smoke box above the boiler flues. The header *d* comprises a transverse chamber provided with a central rearwardly extending pipe in the form of a neck *f* attached to the dry pipe *g* of the boiler from which it receives saturated steam; forwardly extended spaced header branches *h*, of rectangular section, and opening from the header *d*, are also provided. Similarly, the header *e* also comprises a transverse chamber provided with two laterally disposed delivery openings *i* for attachment to the superheated steam pipes at the front of the smoke box, and header branches *j* spaced conformably to the branches *h*, which extend toward the boiler and are intermeshed with said branches *h*. The two headers *c* and *d* are, respectively, supported by the dry pipe and the saturated steam pipes, and are furthermore, firmly bound or clamped together by a lug and bolt construction *k'*.

The superheater units *k* are arranged in vertical rows of smoke tubes, preferably one unit to a tube; each unit comprises two complete pipe loops arranged in series, (the number of loops, however, not being essential to our invention) the two ends *l*, *l*, of each unit being brought out side by side in the same plane and bent upwardly so that one end is finally normal to the bottom of header *d* and in registry with a suitably provided opening *h'* in the bottom of branch *h* and the other end is similarly located as to a corresponding opening *j'* in branch *j*. The unit belonging to the smoke tube immediately below the one just referred to, has its ends similarly bent upwardly to the header branches and in registry with the openings *h'*, *j'* immediately forward of the first named

openings h', j'; and so on for all the units of a given vertical row. All the ends of each row of smoke tubes are thus arranged in rows comprising pairs of parallel planes.

The modification shown in Figs. 4 and 5 is exactly like that shown in Figs. 1 to 3 and just described, except that the two headers d and e are cast in one piece instead of being separate as in the latter figures.

In attaching the ends l, l, of a superheater unit to the header branches, we arrange each of said ends with a spherical enlargement m and each opening h', j' is similarly countersunk, thus providing a ball and socket joint. This joint is tightly drawn up by means of a loose connecting clamp n and a connecting bolt o the clamp having enlarged openings near its ends spaced to agree with the ends l l so as to slip over said ends, and a central hole for the bolt o. This bolt hole is also spherically countersunk on the underside of the clamp to receive a nut p the upper face of which is similarly spherical, an ordinary nut being then used as a check nut. A spherically countersunk washer q is interposed at each end of the connector clamp n between the enlargement m and the clamp proper. By this construction but one steam joint is required for each superheater tube in making connection to the steam collector.

For the construction of Figs. 1 to 3, we use a flat bolt as shown in Figs. 7 and 8, a key r being adapted to fit in a previously provided slot, after the bolt has been slipped up between the two header branches h and j, so as to serve as a bolt head.

In the modification of Figs. 4 and 5 a bolt with usual bolt head r' is employed.

In operation the saturated steam flows into the header d and into the header branches h from whence it goes through all the superheater units in parallel to the superheated steam header branches j, and through the header e out of the laterally arranged openings i to the saturated steam pipes in the front of the smoke box.

By reason of the ball and socket joints which unite the superheater units to the header branches and the similar construction applied to the washers q and the point at which the bolt o supports the connector clamp n, we secure a flexible relation between the headers and the superheater units which yields in conformity with charges of temperature and with mechanical strains due to changes of road-bed and other conditions, while at the same time, keeping the joints perfectly tight at all times.

In the form of our invention shown in Figs. 1 to 3 the key-like bolt end r conduces to the same end the key adjusting itself to any slight change of position between the two header branches. With this form of bolt head, furthermore, any little difference of thickness between the header branches of the saturated steam header and of the superheated steam header becomes immaterial.

In the form of our invention using separate headers (Figs. 1 to 3) said headers may and do have their intermeshed branches completely separated by an air space so that there can be but little loss of heat from the superheated steam header to the saturated steam header. Even when the two headers are combined into one (Figs. 4 and 5) the header branches are separated by an air space *i. e.*, by the bolt slots except at the ends of said branches so that the loss can not be large.

Having described our invention, we claim—

1. In a locomotive provided with a superheater of the class described, a steam collector in the upper part of the smoke box comprising alternate header branches for saturated and superheated steam respectively separated by air spaces, a plurality of superheater units each of which has its ends connected to adjacent header branches, and fastening means passing through said air spaces for detachably securing said units in place, substantially as described.

2. In a locomotive provided with a superheater of the class described, a steam collector comprising alternate header branches for saturated and superheated steam respectively separated by air spaces, a plurality of superheater units each of which has its ends connected to adjacent header branches, and separate fastening means for each unit for detachably securing said unit in place, said fastening means passing through an air space, substantially as described.

3. In a locomotive provided with a superheater of the class described, a steam collector comprising alternate header branches for saturated and superheated steam respectively separated by air spaces, a plurality of superheater units each of which has spherically formed ends connected to adjacent header branches, and fastening means for each unit for detachably securing said unit in place, said means comprising a bolt passing through an air space and a connecting clamp flexibly related both to said spherically formed ends and to said bolt, substantially as described.

4. In a locomotive provided with a superheater of the class described, a steam collector comprising two headers arranged one in front of the other said headers being further provided with mutually intermeshed header branches separated by air spaces, superheater units, and means, including bolts passing through said air spaces, for uniting the ends of said units to adjacent header branches, substantially as described.

5. In a locomotive provided with a superheater of the class described, an integral

steam collector comprising two headers arranged one in front of the other said headers being further provided with mutually intermeshed header branches separated laterally by walls having narrow slots therein, superheater units, and bolts adapted to pass through said slots and provided with means for engaging the ends of said units and uniting them to adjacent header branches, substantially as described.

6. In a locomotive provided with a superheater of the class described, a steam collector comprising two headers provided with mutually intermeshed header branches separated by air spaces, said headers being connected together by mutually engaging lugs and bolts which are fixed to said headers respectively.

7. In a locomotive provided with a superheater of the class described, a steam collector comprising two headers provided with mutually intermeshed header branches separated by air spaces, said headers being yieldingly connected together.

8. In a locomotive provided with a superheater of the class described, a steam collector in the upper part of the smoke box said collector comprising two headers arranged one in front of the other, said headers being further provided with mutually intermeshed header branches separated by air spaces, superheater units, and means including bolts passing through said air spaces, for uniting the ends of said units to adjacent header branches, substantially as described.

9. In a locomotive provided with a superheater of the class described, a steam collector comprising two headers arranged one in front of the other, said headers being further provided with mutually intermeshed header branches separated by air spaces, superheater units, yielding means for holding said headers together, and means including bolts passing through said air spaces, for uniting the ends of said units to adjacent header branches, substantially as described.

10. In a locomotive, in combination, a plurality of smoke tubes, superheater elements in said smoke tubes, a steam collector in the upper part of the smoke box above said smoke tubes comprising two headers having alternate intermeshed horizontal header branches separated by air spaces, the branches of one header being in front of those of the other header, and means including bolts passing through said air spaces for uniting the ends of said units to adjacent header branches.

In testimony whereof we have hereunto set our hands in the presence of two subscribing witnesses.

FRANCIS J. COLE.
SIMON HOFFMANN.

Witnesses as to the signature of Francis J. Cole:
S. W. TYLER,
FRANK F. SCOVILLE.
Witnesses as to the signature of Simon Hoffmann:
JOHN A. KEHLENBECK,
LOUIS ALEXANDER.