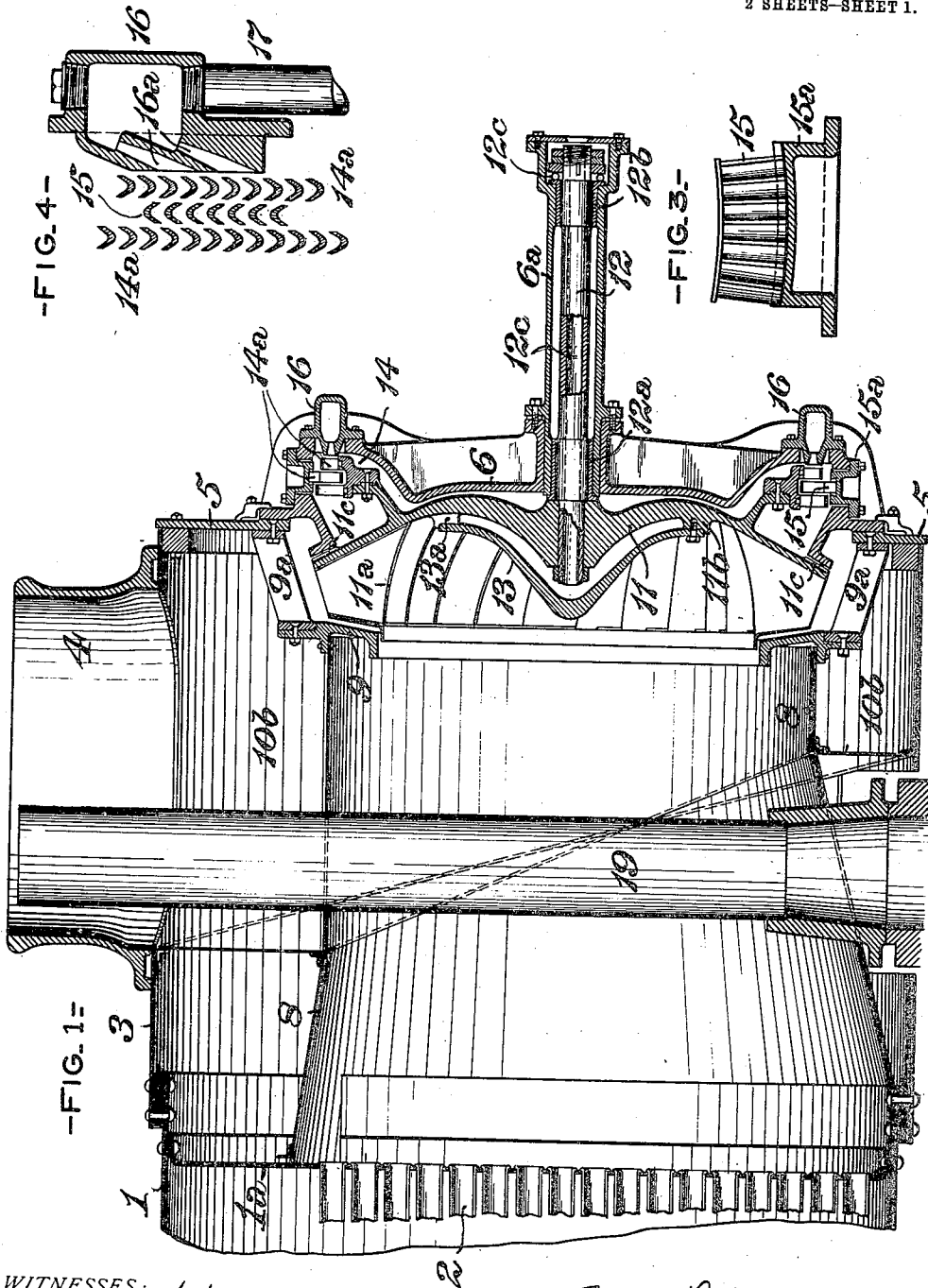


C. J. MELLIN.
DRAFT APPLIANCE FOR LOCOMOTIVES.
APPLICATION FILED JAN. 11, 1913.

1,076,142.

Patented Oct. 21, 1913.

2 SHEETS—SHEET 1.



WITNESSES:

Edward Wright.
S. R. Bell.

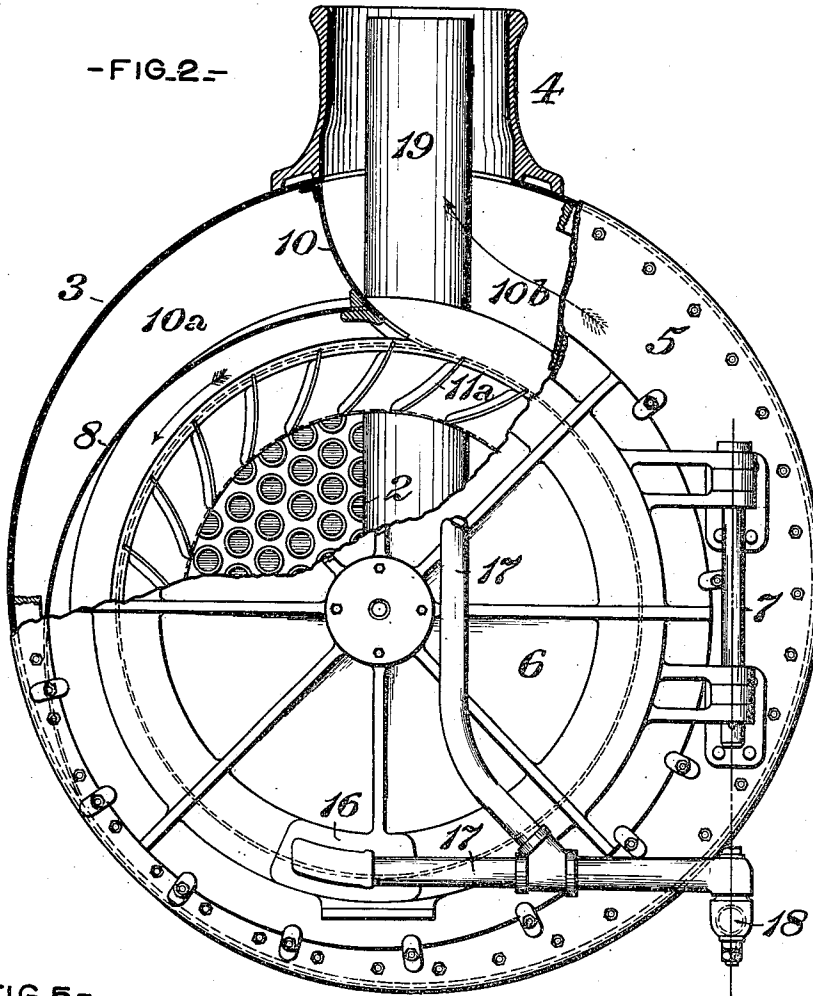
C. J. Mellin.
by J. W. Anderson Bell.
INVENTOR.
ATTORNEY.

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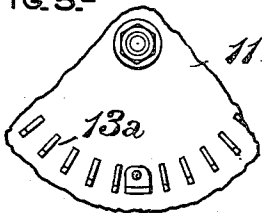
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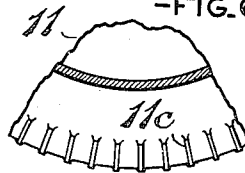
2 SHEETS—SHEET 2.



-FIG. 5-



-FIG. 6-



WITNESSES:
Edward Wright
S. R. Bell

INVENTOR.
C. J. Mellin
By *J. Howard Bell*
ATTORNEY.

UNITED STATES PATENT OFFICE.

CARL J. MELLIN, OF SCHENECTADY, NEW YORK.

DRAFT APPLIANCE FOR LOCOMOTIVES.

1,076,142.

Specification of Letters Patent.

Patented Oct. 21, 1913.

Application filed January 11, 1913. Serial No. 741,400.

To all whom it may concern:

Be it known that I, CARL J. MELLIN, of Schenectady, in the county of Schenectady and State of New York, have invented a certain new and useful Improvement in Draft Appliances for Locomotives, of which improvement the following is a specification.

The object of my invention is to provide an appliance of simple and inexpensive construction, and ready applicability in locomotive engines of the various present standard constructions, whereby the draft necessary to support combustion under service conditions may be induced more economically than by means heretofore ordinarily employed, and the degree of draft induced may be, at all times, under the regulation and control of the engineer.

The improvement claimed is hereinafter fully set forth.

In the accompanying drawings: Figure 1 is a vertical longitudinal central section through the smoke box and forward portion of the waist of a locomotive boiler, illustrating an application of my invention; Fig. 2, a front view, partly in section, of the smoke box; Fig. 3, a section, on an enlarged scale, through a stationary blade block; Fig. 4, a section, on a similar scale, through a nozzle box; Fig. 5, a rear view of a portion of the fan rotor; and Fig. 6, a front view of a portion of the same.

My invention is herein exemplified as applied in connection with a locomotive boiler, 1, having a plurality of fire tubes, 2, through which the products of combustion from the firebox, which is not shown, are discharged into a smoke box, 3, which is provided with a stack, 4, and has, bolted to its forward end, a front, 5, having an opening which, in this instance, is eccentric to the axial line of the boiler, and is closed by a door, 6, which is connected to the smoke box front by a vertical hinge pin, 7, passing through lugs on the door and on the front, in the usual manner.

In the practice of my invention, a casing, 8, of approximately frusto conical form, is connected to the front flue sheet, 1^a, of the boiler, said casing surrounding the set of boiler tubes, 2, and serving to convey the products of combustion therefrom to the opening of an annular fan intake plate, 9, which is located a short distance behind the smoke box front, 5, and is connected thereto

by a plurality of tie bars, 9^a. A curved division plate, 10, extends from the casing, 8, to the top of the smoke box, terminating thereat on one side of the stack, 4, said plate separating the space within the smoke box, on the exterior of the casing, into a dead air chamber, 10^a, and a spiral passage, 10^b, which leads around the casing and intake plate to the stack.

A centrifugal fan, comprising a rotor, 11, and a plurality of peripheral curved blades, 11^a, fixed thereto, is located in the forward portion of the smoke box, and is secured on a shaft, 12, which is journaled in a bearing, 12^a, on the smoke box door, 6, and a bearing, 12^b, on a tubular bearing support, 6^a, secured centrally to, and projecting outwardly from, the door. The end thrust of the shaft is taken on ball bearings, 12^c, rolling on a face on the support, 6^a, and the bearings, 12^a, and, 12^b, may also be of the ball type, if preferred. A conical shield, 13, is secured to lugs, 11^b, on the rotor, a space for the passage of air being interposed between the shield and rotor, by ribs, 13^a, projecting from the latter, the openings between which form air vents, and an air passage, 12^a, communicating with said space and with the atmosphere, extends through the shaft, 12. The shield protects the inner bearing of the fan shaft from the direct action of the hot gases in the smoke box, and, in the rotation of the fan, a current of cold air is drawn in through the air passage of the shaft, which further serves to prevent heating of the bearing.

The centrifugal fan may be rotated by any suitable motor, and, in this instance, is shown as driven directly by a steam turbine, comprising an annular rotor, 14, which is bolted to the forward side of the rotor, 11, of the fan, and two rows of peripheral blades, 14^a, fixed to the rotor, 14. Stationary or guide blades, 15, are interposed between the two rows of rotor blades, and are inclined relatively thereto in the ordinary manner of turbine constructions, said stationary blades being fixed in blade blocks, 15^a, bolted to the smoke box front, 5. Steam is admitted to the turbine through nozzles, 16^a, leading from nozzle boxes, 16, connected to the smoke box, 6, one, two, or more of which nozzle boxes may be used, as desired, the steam being supplied to the nozzle boxes through pipes, 17, which are connected by a swivel joint with a pipe, 18,

leading from the steam space of the boiler, and controlled by a valve in the cab of the locomotive (not shown) by which the speed of the turbine, and consequently the degree of draft upon the fire, may be regulated in accordance with the requirements of service. As shown in Fig. 2, the swivel joint of the steam supply pipes, 17 and 18, is located in line axially with the hinge pin, 7, of the smoke box door, so that the door may be opened and closed, as may, from time to time, be required, without disconnecting the pipes. The exhaust steam from the turbine is discharged into the spiral passage, 10^b, leading to the stack, through the spaces between small radial blades, 11^c, on the rotor of the fan, adjoining the periphery thereof.

The exhaust steam from the cylinders of the locomotive is discharged into the stack through an exhaust pipe, 19, which is open or unrestricted in diameter.

The present universally applied method of inducing draft in locomotive boilers, *i. e.*, by the use of a restricted exhaust pipe from the cylinders, which produces a blast through the stack, involves the well recognized and substantial objection of causing a back pressure upon the pistons which results in a material reduction of power. This is particularly serious in compound locomotives, by reason of the large area of the low pressure piston or pistons. Further, the draft induced by the exhaust blast is not, under all circumstances, proportionate to the demands upon the fire, being, at times, insufficient to generate the required volume of steam, and, at other times, in excess of the requirements of service. These objections are entirely overcome by my invention, the exhaust discharge being unrestricted, and the action of the fan upon the fire being regulated by the engineer in direct proportion to the conditions of operation of the locomotive. The even and comparatively low draft induced by the fan, and the action of the fan blades upon particles of unconsumed fuel that may be drawn through the tubes, will also tend to prevent the projection of sparks and cinders from the stack.

I claim as my invention and desire to secure by Letters Patent:—

1. The combination, with a locomotive boiler, of a door hinged to and closing an opening in the front of the smoke box thereof, a shaft journaled in a bearing on said door, a rotor fixed on said shaft adjacent to the inner side of said door, a plurality of turbine blades fixed on the side of the rotor adjoining said door, a plurality of centrifugal fan blades fixed on the opposite side of the rotor, and means for supplying steam to the turbine blades of the rotor.

2. The combination, with a locomotive boiler, of a fan shaft journaled in the smoke

box door and having an air passage from the atmosphere to its inner end, a centrifugal fan secured thereon, and means for rotating said fan.

3. The combination, with a locomotive boiler, of a fan shaft journaled in the smoke box door and having an air passage from the atmosphere to its inner end, a centrifugal fan secured thereon, a shield fixed to and spaced apart from the inner side of said fan, and means for rotating said fan.

4. The combination, with a locomotive boiler, of a fan shaft journaled in the smoke box door and having an air passage from the atmosphere to its inner end, a centrifugal fan secured thereon, a shield fixed to and spaced apart from the inner side of said fan, ribs interposed between the centrifugal fan and the shield adjacent to the periphery of the latter and providing air vents from the space between the fan and shield, and means for rotating said fan.

5. The combination, with a locomotive boiler, of a tubular bearing support fixed to and projecting outwardly from the smoke box door, bearings in line axially in the door and in said support, a fan shaft journaled in said bearings, a centrifugal fan secured thereon, and means for rotating said fan.

6. The combination, with a locomotive boiler, of a fan shaft journaled in the smoke box door, a centrifugal fan secured thereon, a steam turbine having its rotor fixed to said fan, a nozzle block fixed on the smoke box door, a nozzle in said block adapted to discharge into said turbine, and means for supplying steam to said nozzle block.

7. The combination, with a locomotive boiler, of a fan shaft journaled in the smoke box door, a centrifugal fan secured thereon, a steam turbine having its rotor fixed to said fan, a nozzle box fixed in the smoke box door, a nozzle in said box adapted to discharge into said turbine, and articulated steam pipes leading from the boiler to said nozzle box.

8. The combination, with a locomotive boiler, of a fan shaft journaled in the smoke box door, a centrifugal fan secured thereon, a steam turbine having its rotor fixed to said fan, a blade block fixed to the smoke box front, stationary blades fixed in said blade block, and means for supplying steam to the rotor of the turbine.

9. The combination, with a locomotive boiler, of a fan shaft journaled in the smoke box door, a centrifugal fan secured thereon, a steam turbine having its rotor fixed to said fan, radial ribs adjoining the periphery of the fan between the fan and the rotor of the turbine, the spaces between said ribs providing discharge vents for steam from the turbine, and means for supplying steam to the rotor of the turbine.

10. The combination, with a locomotive boiler, of a fan shaft journaled in the smoke box door, eccentric to the axial line of the boiler, a centrifugal fan secured thereon, an
5 annular fan inlet plate secured to the smoke box front, a casing extending from the front flue sheet of the boiler, around the tubes thereof, to the inlet plate, a division plate
10 extending from said casing to the shell of the smoke box and dividing the space in the smoke box, exterior to the casing, into a dead air space and a spiral passage communicating with the periphery of the fan and
15 leading to the stack, and means for rotating the centrifugal fan.

11. In combination with a locomotive boiler having a smoke box and provided

with a front flue sheet, a shaft mounted in the smoke box front eccentric to the axial line of the boiler, a centrifugal fan secured
20 thereon, means to rotate the shaft, an annular fan inlet plate secured in the smoke box, means for conducting the products of combustion from the front flue sheet to the fan
25 inlet plate, and a partition so located in the smoke box that an exterior dead air space is formed on one side and a spiral passage leading from the periphery of the fan to the stack on the other side.

CARL J. MELLIN.

Witnesses:

G. F. BLUET,
R. F. HALL.