

LOCOMOTIVE ENGINE.

APPLICATION FILED FEB. 16, 1910.

Patented Aug. 2, 1910.

2 SHEETS—SHEET 1.



WITNESSES

James C. Herrou
S. R. Bell

~~INVENTORS~~

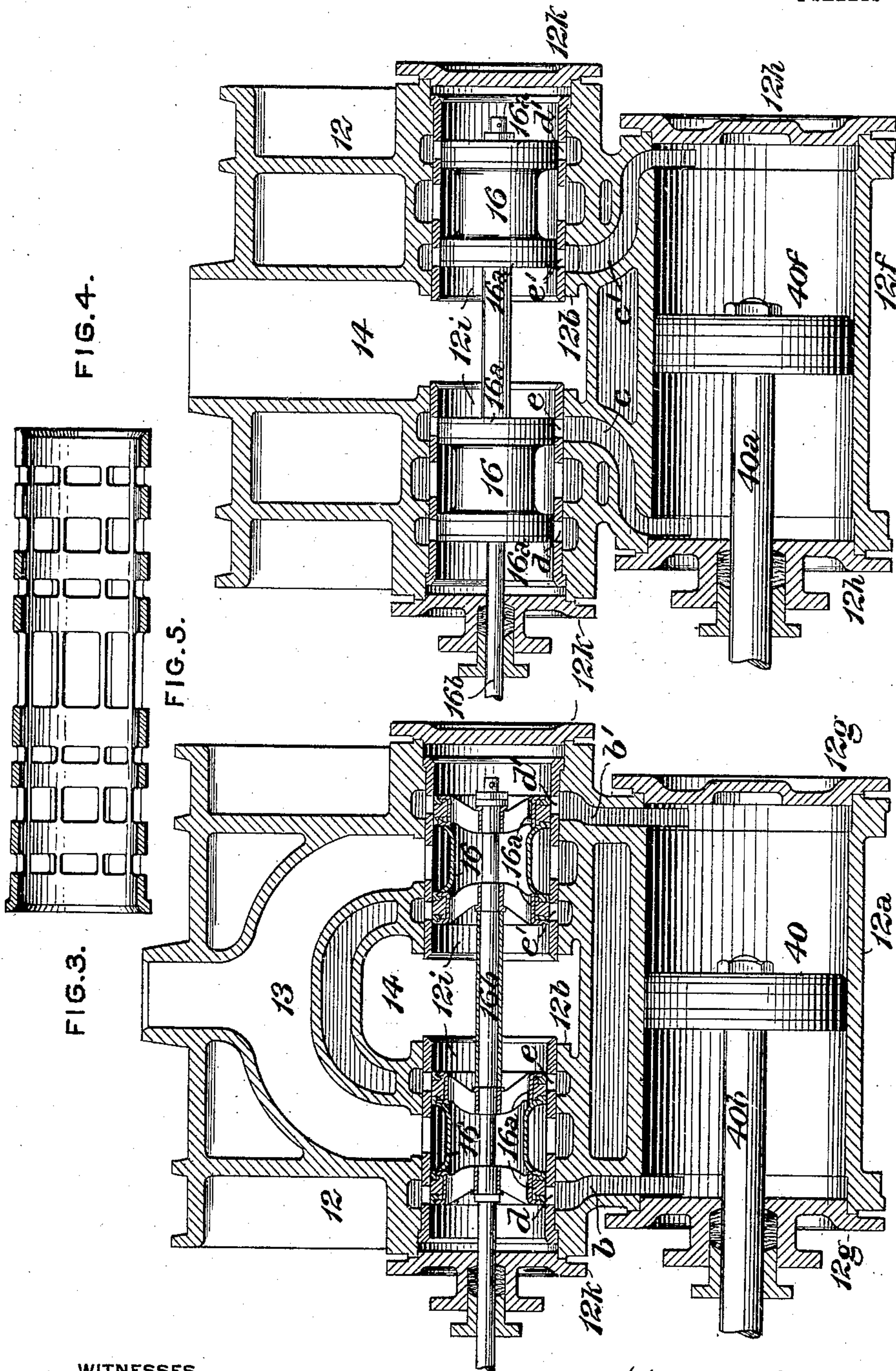
INVENTORS.
Francis J. Cole
and R. Stafford;
by J. Gordon Bell, Att'y.

F. J. COLE & H. R. STAFFORD.
LOCOMOTIVE ENGINE.
APPLICATION FILED FEB. 15, 1910.

966,166.

Patented Aug. 2, 1910.

2 SHEETS—SHEET 2.



WITNESSES
James C. Heron
S. R. Bell.

INVENTORS
Francis J. Cole
Hal R. Stafford
by J. Howard Bell
Att'y.

UNITED STATES PATENT OFFICE.

FRANCIS J. COLE AND HAL R. STAFFORD, OF SCHENECTADY, NEW YORK.

LOCOMOTIVE-ENGINE.

966,166.

Specification of Letters Patent.

Patented Aug. 2, 1910.

Application filed February 15, 1910. Serial No. 544,006.

To all whom it may concern:

Be it known that we, FRANCIS J. COLE and HAL R. STAFFORD, both of Schenectady, in the county of Schenectady and State of New York, have jointly invented a certain new and useful Improvement in Locomotive-Engines, of which improvement the following is a specification.

Our invention relates to locomotive engines of the four cylinder balanced type, and its object is to provide means whereby the admission and exhaust of steam to and from two cylinders of equal diameter, located in parallel planes, may be effected by a single distribution valve appliance, without involving the use of complicated mechanism or of long and tortuous steam and exhaust passages.

The improvement claimed is hereinafter fully set forth.

In the accompanying drawings: Figure 1 is a vertical transverse section through one of the cylinder saddles of a four cylinder balanced locomotive engine, adapted for the practice of our invention, on the line *a a* of Fig. 2; Fig. 2, a longitudinal section through the same, on the line *b d b* of Fig. 1, with the distribution valve appliance in elevation; Fig. 3, a similar section, on the line *b d c* of Fig. 1, with the distribution valve appliance in section; Fig. 4, a similar section on the line *e d b* of Fig. 1, with the distribution valve appliance in elevation, and; Fig. 5, a longitudinal central section through the valve bushing, illustrating a structural modification.

In the practice of our invention, we construct a cylinder saddle, 12, which is substantially similar to prior constructions so far as relates to its general form and manner of connection to a counterpart saddle and to the adjacent side frame member, 8, and in the particular of comprehending, in a single casting, an outer cylinder, 12^f, an inner cylinder, 12^a, of the same diameter as the inner cylinder, and a valve chest, 12^b, located above and between the vertical planes of the outer and inner cylinders. The outer cylinder is closed by heads, 12^h, and is fitted with a piston, 40^f, fixed upon a piston rod, 40^a, and the inner cylinder is closed by heads, 12^g, and is fitted with a piston, 40, fixed upon a piston rod, 40^b. The piston rods are connected to a driving axle or axles in the ordinary manner, and are adapted to be reciprocated, in respectively

opposite directions, by a single distribution valve appliance, the construction of which, and of the related and coöperating cylinder ports and passages, constitutes the subject matter of our present invention and will now be described.

Steam from the boiler is admitted to the valve chest, 12^b, through a steam supply passage, 13, cored in the saddle, 12, said passage being, in the instance exemplified, bifurcated, so as to deliver the steam on opposite sides of the transverse central plane of the chest, and is exhausted from the valve chest through an exhaust passage, 14, cored in the saddle and extending from the central portion of the chest to the top of the saddle, at which it is connected to an exhaust pipe as in ordinary practice. The valve chest is closed at its ends by heads, 12^k, and is lined with a bushing, 12ⁱ, which, in this instance, is shown as formed in two sections, separated by a space at the middle portion of the valve chest, so as to be there constantly in open communication with the exhaust passage. It will, however, be obvious that, if preferred the bushing may equivalently be made in a single piece and be provided with a plurality of ports in its periphery at its middle portion for communication with the exhaust passage, as shown in Fig. 5.

One of the cylinders, in this case the outer one, 12^f, is provided with induction and eduction ports *c, c'*, which are curved longitudinally from the ends of the cylinder toward the central transverse plane thereof and communicate with ports *e, e'* in the periphery of the valve chest bushing. The other cylinder, in this case the inner one, 12^a, is provided with induction and eduction ports, *b, b'* which are substantially in vertical planes, and extend from the ends of the cylinder to peripheral ports *d, d'* in the valve chest bushing, between the ends thereof and the ports *e, e'*. If preferred, the location of the curved and vertical ports, relatively to the cylinders, may be transposed, that is to say, the outer cylinder may be provided with vertical ports and the inner with longitudinally curved ports.

Steam is simultaneously admitted to one end of one cylinder and exhausted from the same end of the other cylinder, by a distribution valve appliance consisting of two inside admission balanced piston valve members, which work steam tight in the

valve chest bushing, 21ⁱ, and are fixed upon a common stem, 16^b, adapted to be reciprocated by any suitable and preferred form of valve gear, in the ordinary manner. Each of the valve members consists of an open ended hollow or tubular body, 16, and two end pistons, 16^a, each of which is fitted with a suitable packing ring or rings. Each valve member receives steam from the steam supply passage, 13, and delivers it to the induction and eduction ports of the cylinders, between its end pistons. The exhaust steam from the cylinder having the longitudinally curved induction and eduction ports, passes from said ports into the central portion of the valve chest bushing, between the two valve members, and thence into the exhaust passage, 14, and the exhaust steam from the cylinder having the vertical induction and eduction ports passes from said ports, through the tubular bodies of the valve members, to the exhaust passage. The valve chest bushing terminals of the vertical ports being located between the ends of the valve chest and the valve chest bushing terminals of the longitudinally curved ports, it will be seen that while steam is being admitted by the distribution valve appliance to one end of one of the cylinders, it is being simultaneously exhausted from the same end of the other cylinder.

It will be obvious that, if preferred, the relative positions of the exhaust and steam passages, 14 and 13, in the saddle, may, without departure from the spirit and operative principle of our invention, be reversed, that is to say, the steam passage, 13, may lead centrally into the valve chest, and the exhaust passage, 14, be bifurcated, having its arms leading into the valve chest between the steam passage and the ends of the chest. The simultaneous admission and exhaust of steam to and from the inner and outer cylinders will be effected by the distribution valve in the same manner as with the relative positions of the exhaust and steam passages first described.

Our improvement, which is of ready applicability in designs embodying the usual relation of cylinders, frames, and valve gear, presents the advantages of simplicity and economy of construction, and the absence of tortuous or unduly long passages in the cylinder saddle.

We claim as our invention and desire to secure by Letters Patent:

1. A locomotive engine cylinder saddle comprising an inner and an outer cylinder located in parallel vertical planes, a valve chest above said cylinders, a passage leading centrally into said valve chest, a bifurcated passage leading into said valve chest on opposite sides of the central passage, in-

duction and eduction passages leading from one of the cylinders into the valve chest adjacent to the ends thereof, and induction and eduction passages leading from the other cylinder to the valve chest between the passages of the first named cylinder and the central passage, these members being combined for joint operation to effect the direct admission and exhaust of steam to and from each of the cylinders.

2. The combination, in a locomotive engine, of an inner cylinder, an outer cylinder, a valve chest having a central passage and passages adjacent to its ends, one of said cylinders having induction and eduction passages leading into the valve chest adjacent to the ends thereof and the other cylinder having induction and eduction passages leading into the valve chest between those of the first named cylinder and the central passage, and a distribution valve appliance controlling the simultaneous admission of steam to one end of one cylinder and the direct exhaust of steam from the same end of the other cylinder, through said induction and eduction passages.

3. The combination, in a locomotive engine, of an inner cylinder, an outer cylinder, a valve chest having a central exhaust passage and steam supply passages adjacent to its ends, one of said cylinders having induction and eduction passages leading into the valve chest adjacent to the ends thereof and the other cylinder having induction and eduction passages leading into the valve chest between the passages of the first named cylinder and the exhaust passage, and a distribution valve appliance comprising two double headed open ended tubular piston valves fixed upon a common stem, each of said valves controlling steam admission to each cylinder between its heads and controlling direct exhaust from one cylinder by its inner head and direct exhaust from the other cylinder through its tubular body.

4. The combination, in a locomotive engine, of a cylinder saddle constructed substantially as herein set forth, and a distribution valve appliance comprising two double headed piston valves having tubular open ended bodies spaced apart upon a common valve stem for communication, through their bodies, with the central passage of the cylinder saddle, and communicating, around their bodies, with the bifurcated passage of the cylinder saddle, whereby the direct admission and exhaust of steam to and from each of the cylinders of the saddle is effected.

FRANCIS J. COLE.
HAL R. STAFFORD.

Witnesses:

S. W. TYLER,
O. C. MYERS.