

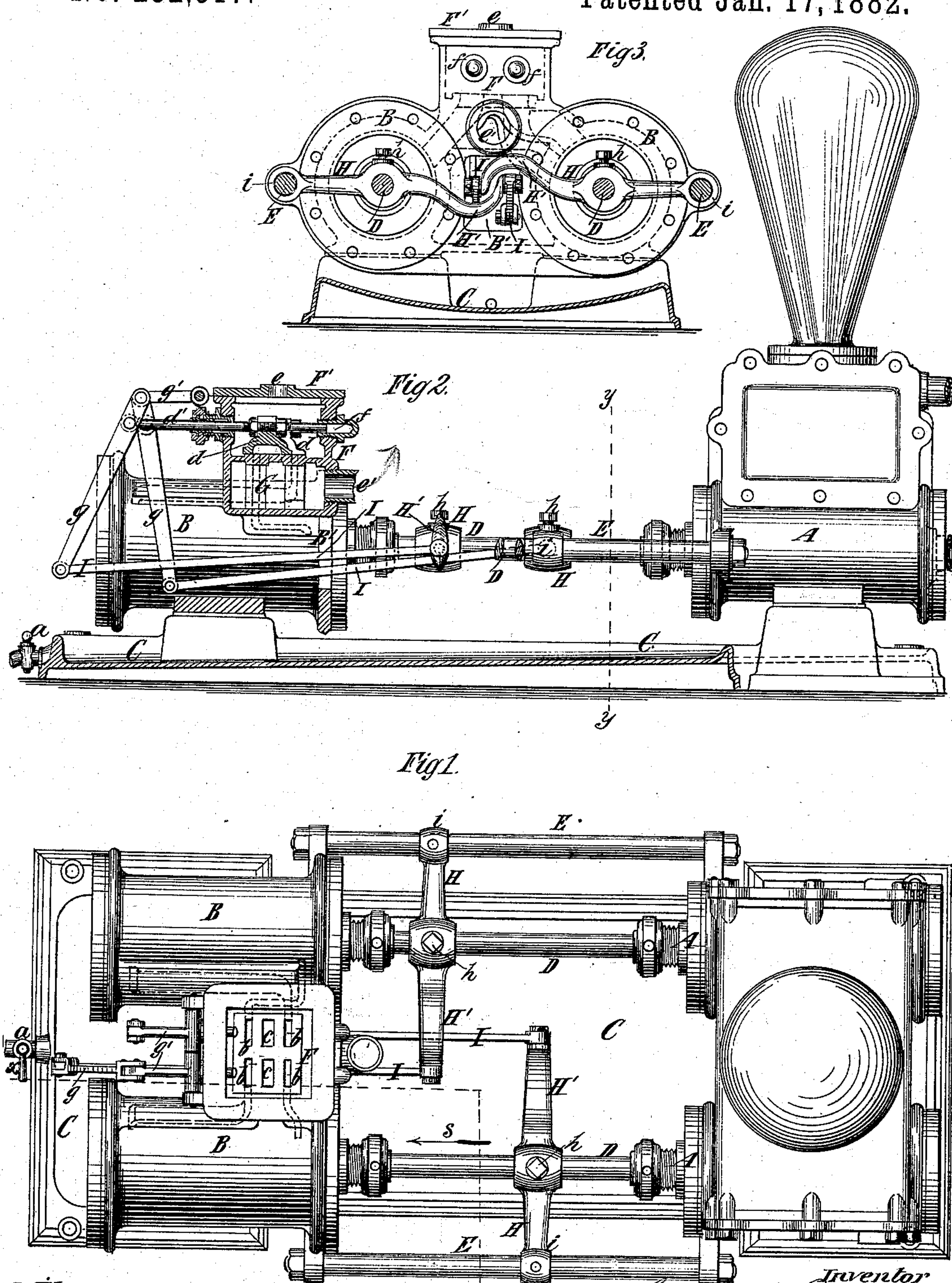
(No Model.)

G. H. REYNOLDS & T. J. RIDER.

DUPLEX PUMPING ENGINE.

No. 252,517.

Patented Jan. 17, 1882.



Witnesses
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UNITED STATES PATENT OFFICE.

GEORGE H. REYNOLDS AND THOMAS J. RIDER, OF NEW YORK, N. Y., ASSIGN-
ORS OF ONE-HALF TO CORNELIUS H. DELAMATER AND GEORGE H. ROBIN-
SON, BOTH OF SAME PLACE.

DUPLEX PUMPING-ENGINE.

SPECIFICATION forming part of Letters Patent No. 252,517, dated January 17, 1882.

Application filed July 23, 1881. (No model.)

To all whom it may concern:

Be it known that we, GEORGE H. REYNOLDS and THOMAS J. RIDER, both of the city and county of New York, in the State of New York,
5 have invented certain new and useful Improvements in Duplex Pumping-Engines, of which the following is a specification.

Our invention relates to duplex pumping-engines or steam-pumps in which the valve
10 of each engine or pump is operated from the piston rod of the other engine or pump; and the principal object of our invention is to dispense with the use of rock-shafts and to otherwise simplify the construction.

15 The invention consists in the combination, in a duplex engine, with the two steam cylinders and piston-rods, of two slide-valves, levers to which said valves are connected and through which they are operated, arms or cross-
20 heads secured to said piston-rods, and rods whereby the said arms or cross-heads are connected each with the valve-operating lever of the other engine, whereby the desired motion is given to the valves in a simple manner and
25 without the use of rock-shafts. The said arms which project from the piston-rod are curved or bowed in opposite directions, one upward and the other downward, so that they may pass each other.

30 The invention also consists in the combination, in a duplex engine, of two steam-cylinders arranged side by side, a single horizontal valve-seat formed above and between said cylinders, two slide-valves working side by side upon said
35 seat and controlling the admission of steam to and its exhaust from said cylinders, mechanism for working said valves, and a single steam-chest common to both cylinders, covering said valve-seat and containing both valves.

40 In the accompanying drawings, Figure 1 represents a partly sectional plan of an engine embodying our improvements. Fig. 2 represents a vertical longitudinal section and side view on the dotted line *x x*, Fig. 1; and Fig. 3 represents a transverse section on the dotted line
45 *y y*, Fig. 2.

Similar letters of reference designate corresponding parts in all the figures.

A designates the pump-cylinders of a duplex

pumping-engine or steam pump, and B designates the steam cylinders thereof, all of which
50 are secured to a bed-plate, C, as in all such engines or pumps. The bed-plate C has raised projections or standards, upon which the cylinders A B are supported and secured; but at
55 other parts the top of the bed-plate is of trough-like or concave transverse section, as seen in Fig. 3, and the said trough-like surface inclines longitudinally from one end to the other of the
60 bed-plate, as seen in Fig. 2. The concave or trough-like bed-plate catches and retains all drippings of oil and of water that condense upon the front head of the pump-cylinders A, and all such drippings are drained to the lower end
65 of the bed-plate, and may be drawn off by a cock, *a*.

D designates the piston-rods, to which are secured the steam and pump pistons, and the cylinders A and B are likewise connected by
70 stay rods or braces E, as best seen in Fig. 1.

With the exception of the bed-plate all the above-described parts may be of any well-known or suitable construction.

F designates a single steam chest, (here represented as above and between both steam-
75 cylinders B,) and in said chest is a single horizontal valve-seat containing two sets of steam ports and passages, *b*, and two exhaust-ports, *c*, which are controlled by two slide-valves, *d*. The steam-chest F is here represented as
80 formed in one casting with the steam-cylinders B, and is provided with a removable cover, *F'*, in which is a steam-inlet, *e*. Below the steam-chest F is an exhaust-chest, G, which has an exhaust outlet, *e'*. The single steam-chest, in
85 connection with two cylinders and a single valve-seat, has many advantages. It lessens the cost of manufacture, both because it saves metal and labor, as the valve-seat for both
90 valves may be planed off at a single cut, and because it saves bolts and labor in making joints; and it is also advantageous because access is afforded to both the two valves *d* by taking off a single cover and breaking one joint. Each valve *d* is secured to a stem, *d'*,
95 which fits in a guide, *f*, in one end of the chest F, and passes through a stuffing-box in the other end thereof, and each valve-stem is op-

erated by a lever, *g*, pivoted above the valve-stem to a link, *g'*, as best seen in Fig. 2.

H designates arms or cross-heads, which are secured to the two piston-rods D by set-screws *h* or otherwise in a secure manner. Each arm H or cross-head has at one end an eye, *i*, which works upon the rod E, thus forming a guide to keep the opposite end of the arm or cross-head always working in the same horizontal plane. The inner ends of the arms or cross-heads H are connected by rods I with the lower ends of the valve-operating levers *g*; and by reference to Fig. 1 it will be clearly seen that the arm which is connected to the piston-rod of one cylinder is connected with the valve-operating lever of the other cylinder, and vice versa.

The cylinders B have formed between them an opening, B', for the passage of the rods I; and in order to enable the two arms or cross-heads H to pass each other and still have their ends to which the rods I are connected in one horizontal plane, the arms or cross-heads are curved or bowed in opposite directions at H', as seen clearly in Fig. 3.

The arrangement of mechanism above described for working the valves is very desirable because of its simplicity, and because it entirely dispenses with rock-shafts, which are commonly used in the valve-gear of duplex engines.

It will be clearly seen that the valves *d* are moved in the same direction as the pistons which operate them, and therefore to enable each steam-piston to commence its stroke while the other steam-piston is moving the steam-passages of one cylinder must be crossed. The right-hand cylinder, Fig. 3, has its steam-passages *b* crossed, as shown clearly in Fig. 1 in dotted outline, so that the left-hand piston-rod, while moving in the direction indicated by the arrow S, Fig. 1, and while moving the right-hand valve in the same direction, may admit steam to the right-hand cylinder to force its

piston in the opposite direction to that indicated by the arrow S. The crossing of these ports forms no part of our present invention.

By our invention we provide a duplex engine of very simple construction, which is not liable to get out of order, and which will work as well as if not better than engines which are much more complicated in construction and expensive to keep in repair.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. In a duplex engine, the combination, with the two piston-rods and steam-cylinders, two slide-valves, levers to which said valves are connected and through which they are operated, of arms or cross-heads secured to said piston-rods, and rods whereby said arms or cross-heads are connected each with the valve-operating lever of the other engine, substantially as and for the purpose specified.

2. In a duplex engine, the combination of the steam-cylinders B, the piston-rods D, the valves *d*, the levers *g*, the arms or cross-heads H, bowed or curved in opposite directions at their inner ends, and the rods I, each connecting with the lever *g* of the other engine, substantially as and for the purpose specified.

3. In a duplex engine, the combination of two steam-cylinders arranged side by side, a single horizontal valve-seat formed above and between said cylinders, two valves working side by side upon said seat and controlling the admission of steam to and its exhaust from said cylinders, mechanism for working said valves, and a single steam-chest common to both cylinders, covering said valve-seat and containing both valves, substantially as specified.

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