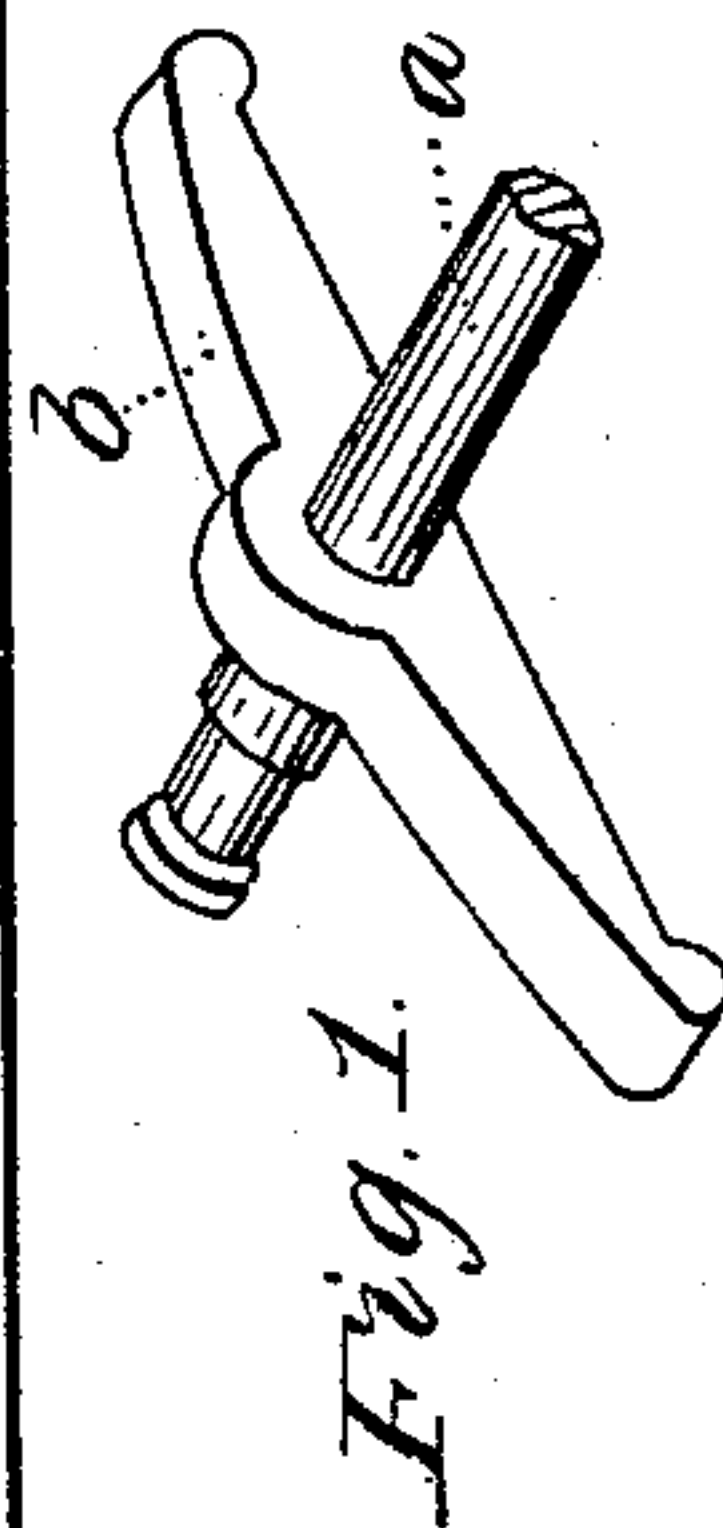
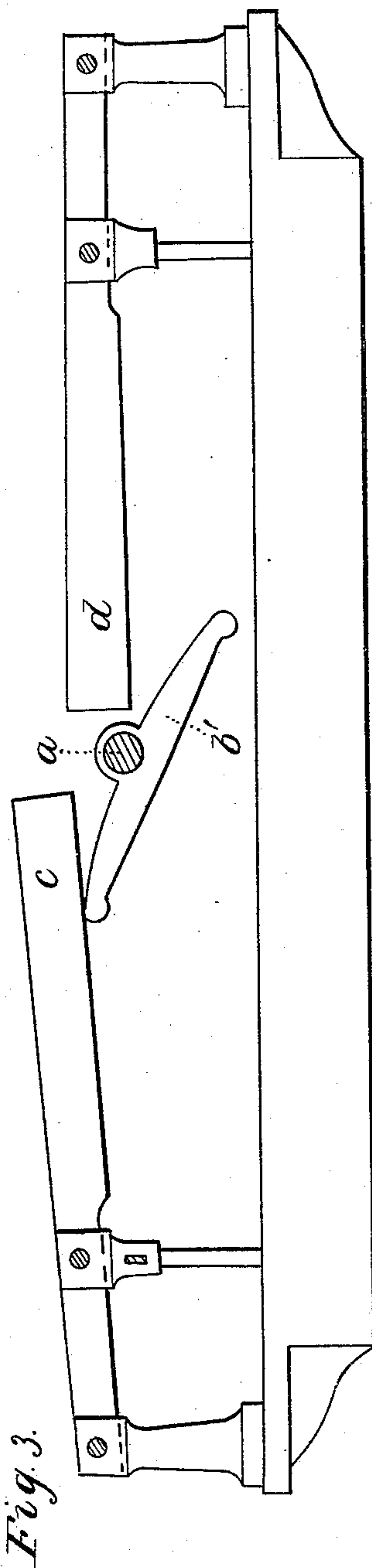
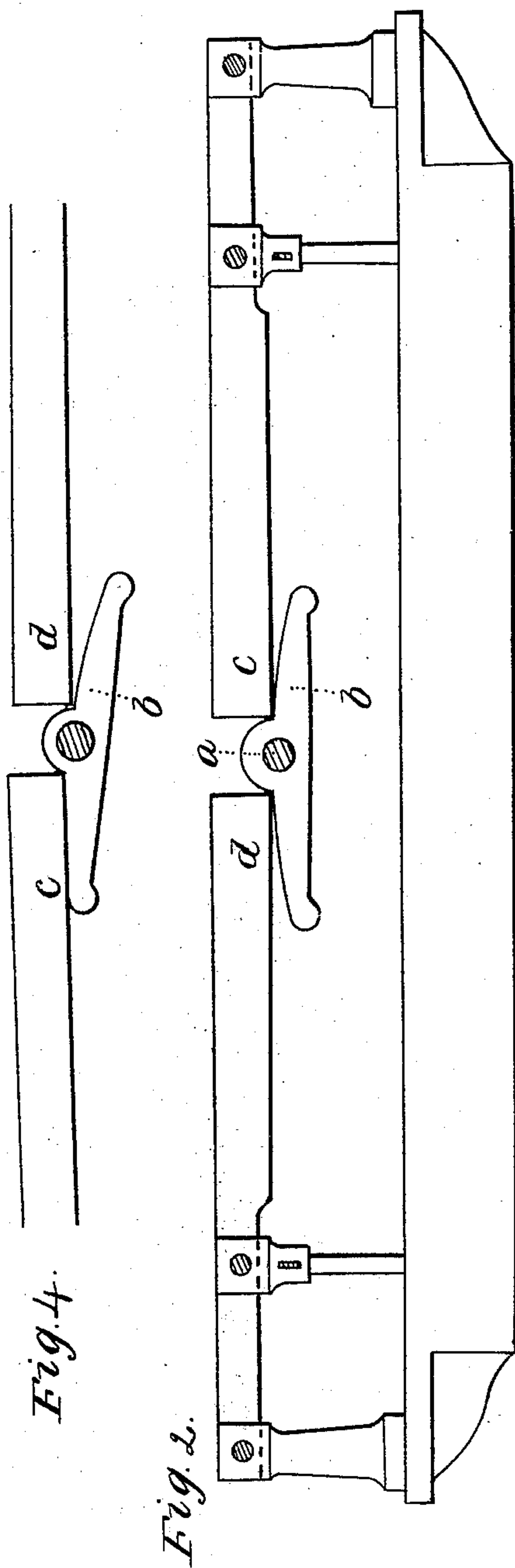


A. Hartuppe,
Steam-Engine Valve-Gear.
N^o 32,690. Patented July 2, 1861.



UNITED STATES PATENT OFFICE.

ANDREW HARTUPEE, OF PITTSBURG, PENNSYLVANIA.

VALVE-GEAR OF STEAM-ENGINES.

Specification of Letters Patent No. 32,690, dated July 2, 1861.

To all whom it may concern:

Be it known that I, ANDREW HARTUPEE, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a
5 new and useful Improvement in Lifters for Puppet-Valves of Steam-Engines; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the annexed drawings,
10 forming part of this specification, in which—

Figure 1, is a perspective view of my improved lifter detached from the engine. Fig. 2 is a side view thereof as applied to a horizontal engine, neither of the valves being
15 raised. Fig. 3 represents the lifter turned so as to raise one valve. Fig. 4 represents the lifter partly turned showing its action on the point of the lever.

My improvement consists in connecting
20 the lifters, for the puppet valves of steam engines of such a shape that they will raise the levers of the valves by rolling contact or nearly so thus not only saving friction and avoiding the wearing away of the lever and
25 lifter, but by applying the force of the lifter at the commencement of the stroke to the end of the lever instead of near its center, effecting a saving of power and increasing the efficiency of the engine.

30 To enable others skilled in the art to make and use my improved lifter, I will proceed to describe its construction and operation.

In the drawings *a* is the shaft which carries the lifters *b*, *b'*. Each engine has two
35 lifters of the same size and shape, one of which *b* works loose on the shaft *a*, and the other *b'*, being fastened to the shaft works with it in the usual manner, in order to admit of the reverse motion necessary to raise
40 the lever of one of the said valves at one end of the cylinder, while the lever of one of the exhaust valves is raised at the other end. In the drawings one lifter and one pair of valves only are shown in each figure
45 and for the sake of illustration Fig. 2 may represent the valves and lifter on one side, and Fig. 3 the valves and lifter on the other side of the cylinder of the steam engine.

c, *c*, are the levers to work the exhaust
50 valves, and *d* *d* the levers to work the said valves.

The engine is of the ordinary construction, as my improvement is applicable to almost any kind of engine.

My improvement in lifters consists in 55 forming them of the shape shown in Fig. 1, the upper surface or outline of the lifter being a uniform curve or arc of a circle, the edge or tangential point of which, (midway from either end,) I place either exactly 60 in the center or axis of the shaft *a*, which carries it, or near to the center, and within the circumference of the shaft *a*. The advantage of this arrangement will be seen, by reference to Fig. 4, to be, that when the 65 shaft *a* turns so as to raise one arm of the lifter *b*, instead of the face of the lever being applied first to a point in the lever, *c*, some distance from the extremity of the lever, the point of the lever which rests on 70 the curved surface of the lifter, near to the shaft (which is the center of motion), first receives the force of the lifter, and as the lifter rises, instead of rubbing along the under side of the lever it raises it to the point 75 shown in Fig. 3, by rolling contact or nearly so, thus very materially diminishing the friction, saving power and causing the engine to work more smoothly as the levers are raised with less of a jerk. In lifters as 80 ordinarily constructed the lifter exerts less power on the lever to raise the valve at the moment when it begins to rise, than afterward, while the reverse should be the case, as the greatest force is needed just when the 85 valve is first raised. And this I effect by my improvement which raises the levers from the point, while the ordinary lifters raise them at some distance from their extremity. My invention thus renders the 90 valves equal in efficiency and easy of operation to balance valves, so that by the use of them the engineer has much greater control of his engine, than with lifters of other constructions. 95

Having thus described my improvement what I claim as my invention and desire to secure by Letters Patent is,

The use of lifters for puppet valves of steam engines so constructed and arranged 100 in relation to the shaft on which they are placed and by which they are operated, as

that their extremities shall be in the line of
an arc of a circle the tangential point of
which, where it intersects said shaft, shall
pass within the circumference of the shaft,
5 and either through its axis or near thereto,
for the purpose hereinbefore set forth.

In testimony whereof I have hereunto set

my hand this fifth day of August A. D.
1856.

ANDREW HARTUPEE.

Witnesses:

W. DUDLEY KING,
AND. McMASTER.