

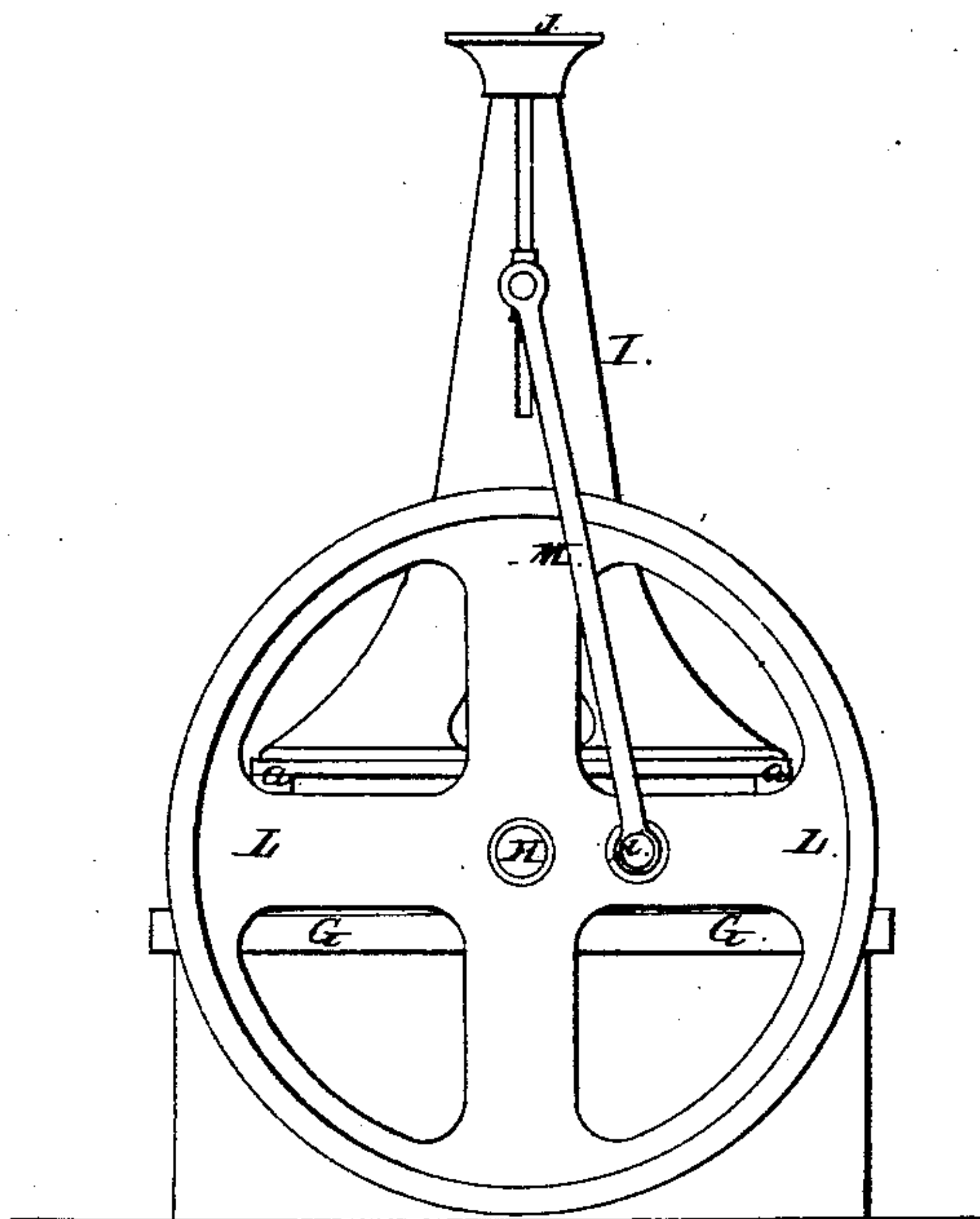
*Fritz & Moore,*

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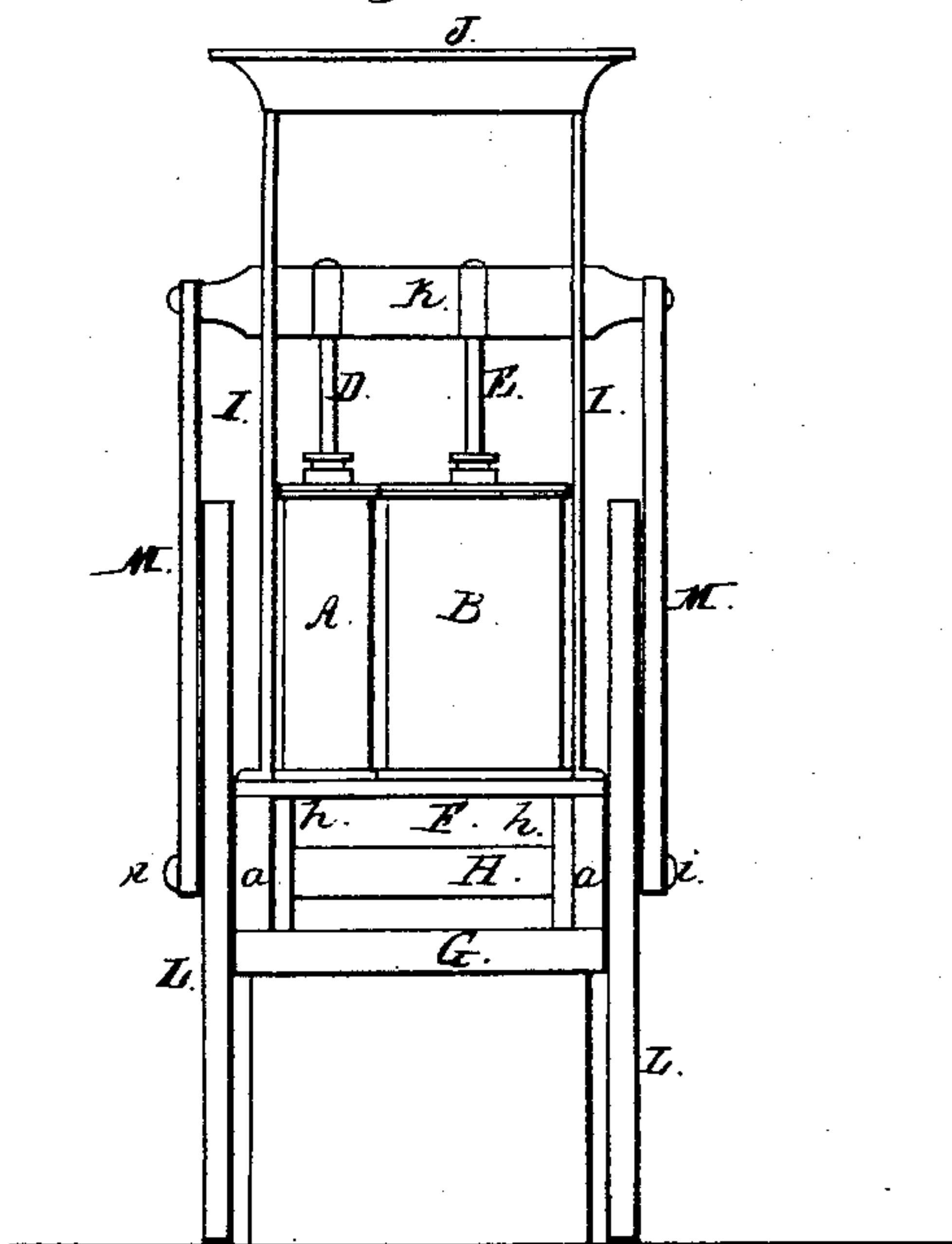
*N<sup>o</sup> 13,678.*

*Fig. 1.*

*Patented Aug. 2, 1864.*



*Fig. 2.*



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# UNITED STATES PATENT OFFICE.

JOHN FRITZ, OF BETHLEHEM, AND JAMES MOORE, OF PHILADELPHIA, PA.

## IMPROVEMENT IN BLOWING-ENGINES.

Specification forming part of Letters Patent No. 43,678, dated August 2, 1864.

*To all whom it may concern:*

Be it known that we, JOHN FRITZ, of Bethlehem, Pennsylvania, and JAMES MOORE, of Philadelphia, Pennsylvania, have invented an improvement in Blowing-Engines; and we do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

Our invention consists in a blowing-engine having a steam-cylinder and blowing-cylinder arranged side by side and in juxtaposition with each other, substantially as hereinafter described, in combination with a cross-head, connecting-rods, and crank-shaft of a strength sufficient to resist the leverage imparted to the cross-head by the transmission through the same of the power of the steam-cylinder to the blowing-cylinder.

In order to enable others skilled in the art to make and use our invention, we will now proceed to describe its construction and operation.

On reference to the accompanying drawings, which form a part of this specification, Figure 1 is a side view of our improved blowing-engine, and Fig. 2 a front view of the same.

A is the steam-cylinder, and B the blowing-cylinder, of our improved engine, the said steam-cylinder being provided with the usual piston, having the piston-rod D, and with any suitable system of valves, operated by an eccentric on the crank-shaft or otherwise, and the blowing-cylinder being also provided with a suitable piston, having the piston-rod E, the usual arrangement of inlet and outlet passages and valve apparatus such as are employed in connection with engines of this class being used in the present instance.

As our invention has no relation to any particular form or arrangement of valves, passages, and operating-gear, either for the steam-cylinder or blast-cylinder, it has not been deemed necessary to illustrate or describe them.

The cylinders A and B are arranged side by side and as close to each other as circumstances will permit, both being secured to the plate F, and the latter being secured to the foundation G, which is arranged by the pieces *a a* so far beneath the said plate F that there may be sufficient room between the two for

the crank-shaft H and the two boxes *h h*, in which the shaft turns. Two frames I and I' are secured to the plate F, and are connected together at the top by the cross-piece J, and in vertical slots in these frames slides the cross-head K, to which the two piston rods D and E are firmly secured. To each end of the crank-shaft H is secured a fly-wheel, L, one being situated on one side and the other on the opposite side of the frame-work and foundation of the engine. To each fly-wheel, at the desired distance from the center, is secured a pin, *i*, the pin of one wheel being connected to one end of the cross-head K by a rod, M, and the pin of the other wheel to the opposite end of the cross-head by a similar rod.

Of the blowing or blast engines now used those which are termed "bull-engines," those known as "beam engines," and the ordinary horizontal engines are the most common. In the bull-engines the steam-cylinder is situated either directly above or directly below and in a line with the blowing-cylinder, there being a cross head, two connecting-rods, and a crank-shaft to secure the uniform and limited movement of the piston. The great objection to engines of this class is, that they are of necessity top-heavy, and demand heavy frames, braces, and stays in their construction. They are, moreover, of such an excessive height that access to many of the parts and the conducting of repairs is difficult and dangerous.

Beam-engines are necessarily costly structures, and require massive beams and frames and very heavy foundations; at the same time they occupy more space than can be conveniently afforded near ordinary furnaces.

Horizontal engines have for various reasons been discarded by those experienced in this class of machinery, and they possess the disadvantage to a greater extent than beam-engines of occupying an inordinate space.

Our improved engine has been designed with the view of arranging the whole of the parts so as to occupy as little room as possible in height, and with the view of producing a blowing-engine with very light and simple frame-work, and one demanding but a very slight foundation.

As the power is imparted from the steam-cylinder A to the blowing-cylinder B through the cross-head K, a leverage proportionate to



the distance between the two piston-rods must be exerted on the cross-head. This leverage will at first sight appear to be an insurmountable obstacle to the proper working of our improved blowing-engine, owing to the tendency to cause constant lateral strains to the piston rods, frame-work, and, in fact, the whole engine, and this would certainly be the case but for the provisions we have made to meet the difficulty. In the first place, the cross-head is made strong enough to withstand the above-mentioned leverage; secondly, each connecting-rod must be made of sufficient strength to withstand the same tensile strain and crushing force as the piston D of the steam-cylinder, or, in other words, the two rods together must be strong enough to resist double the power of the engine; and, thirdly, the shaft H must also be of sufficient strength to transmit double the power of the engine. It will of course be understood that the ends of the rods M M, where they are connected to the cross-head and to crank-pins, and the crank-pins themselves must be made proportionately strong and heavy.

A blowing-engine constructed in accordance with the above-described arrangement of cylinders and strengthening of the working parts has been recently put in operation and has been found to work with admirable steadiness and uniformity, and indicates no tendency whatever to rock or jar.

Although we prefer the arrangement of one steam-cylinder adjacent to a single blowing-cylinder as being the most simple and economical, it will be evident that two or more steam-cylinders may be arranged by the side of one blowing-cylinder, or two or more blowing-cylinders by the side of one steam-cylinder, the same plan of increasing the strength of cross-head, connecting-rods, and crank-shaft being carried out in accordance with the relative positions of the blowing and steam cylinders.

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

A blowing-engine having a steam-cylinder and blowing-cylinder arranged side by side and in juxtaposition with each other, in combination with a cross head, connecting-rods, and crank-shaft of a strength sufficient to resist the leverage imparted to the cross-head by the transmission through the same of the power of the steam-cylinder to the blowing-cylinder, all substantially as set forth.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

JOHN FRITZ.  
JAMES MOORE.

Witnesses:

A. I. ERWIN,  
H. J. MILCHSACH.