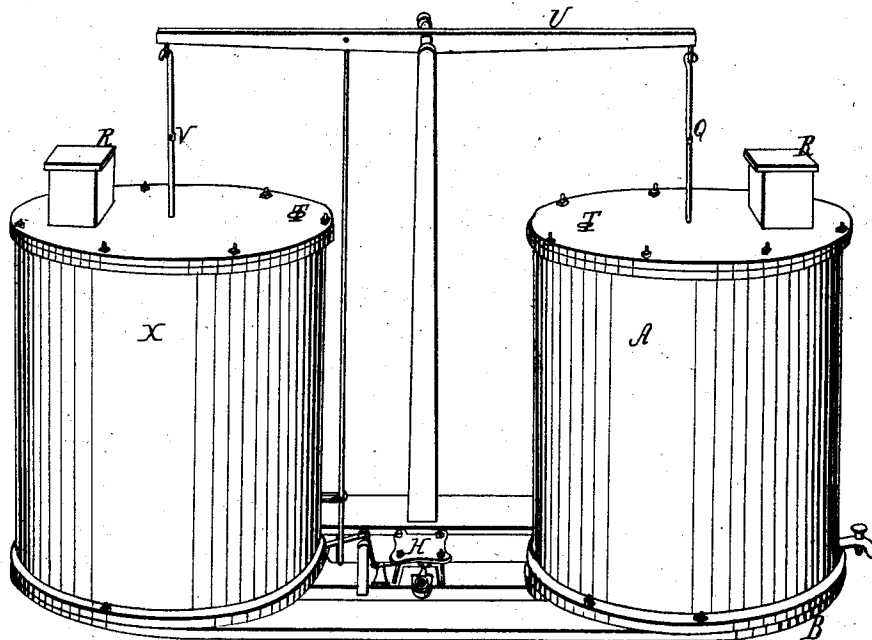


*M. Bell,*  
*Air Blast.*

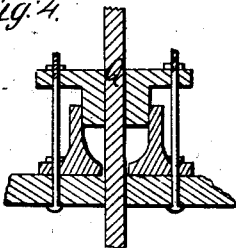
*N<sup>o</sup> 705.*

*Patented Apr. 24, 1838.*

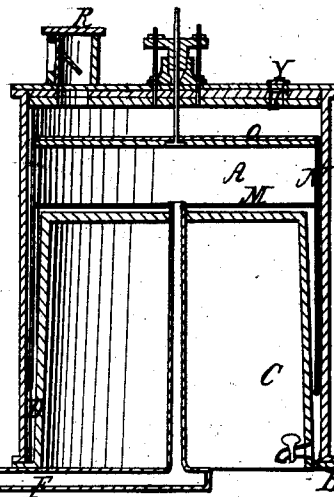
*Fig. 1.*



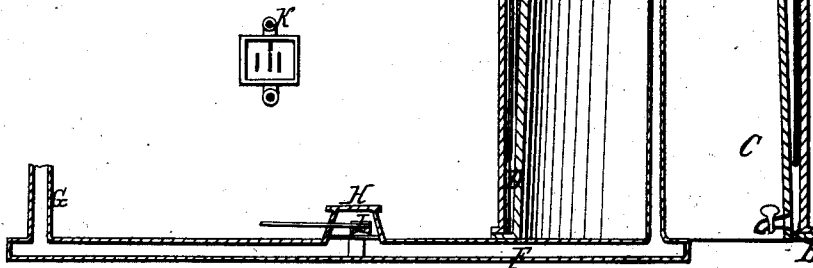
*Fig. 4.*



*Fig. 2.*



*Fig. 3.*



# UNITED STATES PATENT OFFICE.

MARTIN BELL, OF ANTIS TOWNSHIP, HUNTINGDON COUNTY, PENNSYLVANIA.

## WORKING BELLOWS BY STEAM.

Specification of Letters Patent No. 705, dated April 24, 1838.

*To all whom it may concern:*

Be it known that I, MARTIN BELL, of Antis township, in the county of Huntingdon and State of Pennsylvania, have invented a new and useful Improvement, being a bellows for creating the blast for furnaces and for other purposes by steam, called "Bell's steam-bellows," which is described as follows, reference being had to the annexed drawings of the same, making part of this specification.

The nature of my invention consists in making the steam act on the under side of a vibrating cylinder open at the lower end, which will be called for the sake of brevity a piston, in a cylinder, for producing a blast on the other side, using oil as a packing, thereby saving much friction.

To enable others to make and use my invention I will proceed to describe its construction and operation.

This steam bellows consists of a cylinder A, Figures 1 and 2, twice the required stroke of the piston, nearly the same diameter inside, as the piston or vibrating cylinder closed at the top, except the apertures hereafter described for the piston rod, the admission of air and for the discharge of the blast. To the bottom of this outer cylinder is secured by flanges and bolts a circular rim B. To this rim is fastened another cylinder C, of lesser diameter and length than the one before described and placed in an upright position within it, leaving a space D of about 4 or 6 inches between the two all around to contain the oil which is to stand about two or three inches above the top of the cylinder C. This cylinder C is for the purpose of lessening the quantity of oil. The two cylinders may be made of wood or iron. Gage cocks are inserted into the side of the outer cylinder to try the height of the oil.

Through the center of the head of the inner cylinder C passes a tube E rising above said head about 6 inches for admitting the steam and one inch above the top of the float hereafter described. The lower end of this pipe is connected with a horizontal tube F which is connected to the lower end of the vertical tube G of the other cylinder X hereafter described. In the center of the horizontal tube F is a valve box or steam chamber H, in which is inclosed a common sliding valve I. To this box is attached a steam tube at K Figs. 1 and 3 which leads

to the boiler for conveying the steam. The sliding valve is worked by means of rods and elbows or other contrivances well known to mechanics.

Upon the top of the oil is placed a float M, Fig. 2, of the same shape and nearly of the same size of the inside of the piston cylinder.

The piston or vibrating cylinder consists of a sheet iron cylinder N of a greater diameter than the inner cylinder and of a lesser diameter than the outer cylinder to move without friction closed at one end by a head O and open at the other. This vibrating cylinder is put over the inner cylinder—its sides in the oil and its head above the floats and mouth of the steam tubes—it has a piston rod Q extending upward through the center of the head of the outer cylinder—the aperture through which it passes being surrounded by packing. In this head is an opening R surrounded by a box in which there is a swinging valve S. In the same head there is an aperture T into which is inserted the blast tube. This blast tube is also furnished with a valve Y that opens outward. The blast tubes are not shown in the drawings.

The steam enters between the vibrating cylinder or piston and float driving the former to the top, of the outer cylinder and the latter acting upon the top of the oil. The rising of the piston condenses suddenly the air in the cylinder and causes it to pass through the blast tube,—the closing of the swinging valve through which it entered preventing its escape in that direction.

The size of the piston should be as near the size of the inside of the outside cylinder as it can work freely without creating friction.

The piston rod is attached to a vibrating beam U, or lever by a shackle-bar to which the piston rod V of the cylinder X is attached at the other end. This lever or beam is also made to work the pumps fly wheel, valves &c. The fly wheel can be attached to the vibrating beam by pitman and crank in the usual manner.

A common condenser may be attached which will save much steam, and in case of using the condenser the lower edge of the piston or vibrating cylinder should be immersed in the oil at all times about two feet.

Should the oil raise too high from the condensation of the steam the water can be

let off at the bottom by a common cock which can be worked by hand or made to act by a rod fastened to the float on top of the oil—the rod extending down through the oil and head of the inside cylinder attached to the cock by levers in any known manner—said rod working tight through common packing.

The other cylinders, pistons, valves, tubes, &c., placed by the side of the one just described are constructed in a similar manner.

Now, having placed the pistons in the cylinders fasten the tops of said cylinders thereon. The steam being up, one piston being raised and the other down, the communication will be opened from the boiler to the piston that is down, by the slide valve. The steam will then rush in and act against the under side of the piston head and downward against the oil, which will cause the piston to rise, the air becoming condensed above will act against the oil around the piston and keep it from rising but a very

little higher than on the inside—the steam continuing to enter the piston will rise to the top of the outer cylinder—or until stopped by the crank and fly wheel. The other piston being now down and steam being let on it will ascend in the same manner.

The invention claimed by me, the said MARTIN BELL, consists in—

Inclosing the outer cylinder A by a head, through which the piston rod of the cylinder N works air tight, by means of a stuffing box; and the particular arrangement and combination of the parts by which the steam is admitted and made to operate upon the lower side, or interior, of the cylinder N as constituting a component part of a blowing machine in the manner set forth.

MARTIN BELL.

Witnesses:

WM. P. ELLIOT,  
EDMUND MAHER.