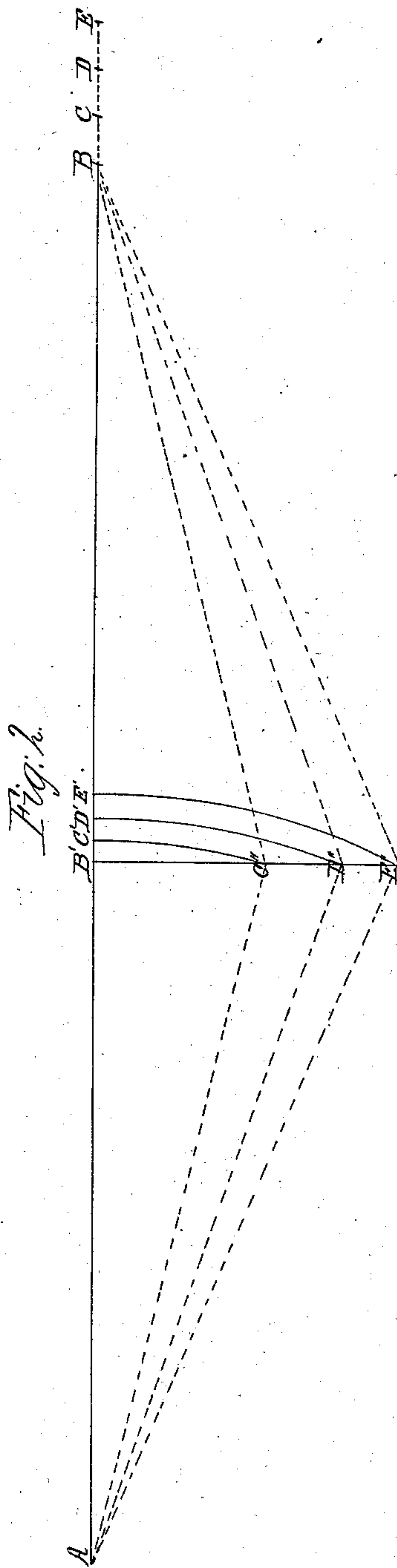
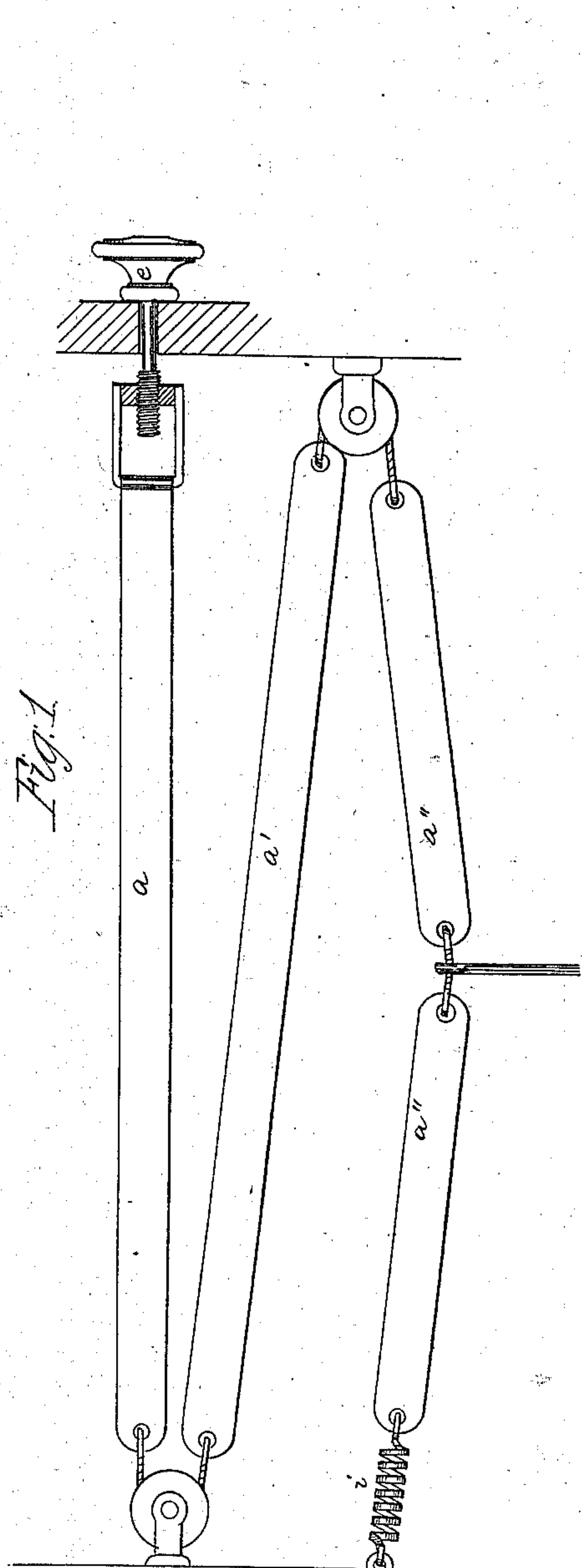


*J. P. Trimble,*

*House Ventilator,*

*N<sup>o</sup> 12,534.*

*Patented Mar. 13, 1855.*





# UNITED STATES PATENT OFFICE.

ISAAC P. TRIMBLE, OF LIVINGSTON, NEW YORK.

## APPARATUS FOR OPERATING VENTILATORS.

Specification of Letters Patent No. 12,534, dated March 13, 1855.

*To all whom it may concern:*

Be it known that I, ISAAC P. TRIMBLE, of Livingston, county of Columbia, and State of New York, have invented a new and useful Improvement in Apparatus for Operating the Ventilators of Apartments; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being made to the annexed drawings, making a part of this specification, in which—

Figure I represents the manner of arranging the bands, and Fig. II is an illustrative diagram.

My invention consists in an improved method of arranging and applying the force derived from the expansion and contraction of metal, to the purposes of ventilation and the regulation of temperature in apartments, dwellings, conservatories, graperies, &c. I am quite aware that the mechanical force thus derived has been proposed for the attainment of these purposes, but so far as I am acquainted with the mode or modes contemplated, thus far none have proved successful. This arises chiefly from the fact that the comparatively small motion obtained from the expansion-bars by the ordinary changes of temperature in the apartments to be regulated, was not sufficient to be utilized in the opening of valves &c. wherein a considerable movement and power is required. In the plan described by Dr. Ure for constructing an apparatus for similar purposes, of two bars of metal or other materials of different expansibility, it has been found that the force derived was not sufficient to effect the operation against the resistance produced by so extended a leverage, and that therefore all the power was absorbed in some way within the bars themselves or in the play of the joints of the levers. It is of course readily understood that to render the force thus derived, useful, it must be capable of application at very small changes of temperature, the range perhaps not exceeding ten or fifteen degrees. Ten degrees is that within which I propose employing this force, and in that the whole motion necessary for throwing wide open or completely closing a set of valves must be obtained from the extension or contraction of the metal. Zinc is among the most expansible of metals, yet in order to attain an extension in length of one inch only by

ten degrees increase of temperature, would require a piece about 500 feet long, and thus it will be seen how small must be the movement from pieces commonly available, when the power required is at the same time taken into consideration. Besides the plan for obtaining the necessary motion, I have also one for the form of the metal by which it is intended to secure sensitiveness and consequently rapidity of motion with strength. Neither round nor square bars would accomplish this, and those would be also deficient in the necessary amount of flexibility. I therefore make the expansion bars in the form of thin strips or bands; of such various widths as will afford the power circumstances may require. By this means a large surface is exposed and thereby quickly acted upon by changes of temperature. The principal feature however of my invention is the manner of applying the power so as to get the most extended direct motion with the least range of temperature. This may be understood by an inspection of the diagram Fig. II, in which A, B will represent one of the metal bands at the position of  $0^{\circ}$  when it is drawn into a straight line, and supported at the ends A B. By raising the temperature, the band will be extended, and if the supports A B were kept immovable it would be deflected in some direction (as at A, C'', B) by any given extension in length, as say equal to from B to C. Now if a weight were hung upon the band at B' it would have moved over the distance from B' to C'', whereas had it been by the direct extension of the cord in a horizontal line it would have gone only to twice the distance from B' to C'. By doubling this amount of expansion, as from A to D', the deflection is to D'', and from A to E', is to F'', &c., from which it will be seen that the ratio or distance from point to point in the deflection diminishes according to well known laws in geometry. The most useful effect is therefore obtained by the first degrees of expansion, and these I accordingly use within the narrow limits of temperature before named, and to this end a certain arrangement of the metal bands and a means of adjustment is necessary in order that they shall begin to act at given temperatures. This will be apparent by giving some dimensions to the diagram Fig. II and supposing a certain extension of the



cord; I give therefore the following, A, B is called 40 feet, or 240 inches from A to B'. The distance from B' to C'' by an expansion in the length A B of one inch will be as follows:

$$\begin{array}{r} 240.5^2 = 57840.25 \\ 240^2 = 57600 \\ \hline 240.75 \end{array}$$

$$\sqrt{240.75} = 15.51$$

Or B' to C'' will be fifteen  $\frac{51}{100}$  inches; in like manner by an extension of two inches, B' to D'' will be twenty-one  $\frac{93}{100}$  inches, and by an extension of three inches the distance B' to E'' becomes twenty six  $\frac{87}{100}$  inches. As no such extent of length as would give an expansion of one inch for ten degrees could conveniently be had, it becomes necessary to effect the object by a different arrangement. This I do by combining together a number of strips of the expansion bands, of such length as may be conveniently incased within a small frame, as may be seen in the drawings at (a, a', a''), the last one (a'') being that from which the power is taken off. Now as before shown, the greatest range of motion or deflection of the band by the least extent of expansion, is where it starts from a horizontal or straight line, and I have therefore arranged my apparatus so that by means of a set-screw at one end of the expansion-bars they can be tightened or set to begin to act at any required temperature. Thus suppose an apartment is to be kept at a temperature ranging between 60° and 70° F. I take up the stack of the bands (a a' a'') so that at that temperature of 60° F. the valves or ventilating-flaps will all be closed, and then regulate it so that at 70° F. they will all be wide open. But in order to prevent accidents to the bars by their contracting under an accidental reduction of the temperature below 60° I provide a resisting spring at the end opposite to the screw, or the screw may be itself attached directly to the end of the spring, as will be more clearly shown

by the following description of the apparatus.

At (a, a') are shown the expansion bands, consisting of strips of thin metal of which the most expansible kind is the best to use and I accordingly employ generally zinc. These strips are combined together by cords passing over pulleys, as shown, or may be otherwise attached to levers or rock-shafts. At (e) is the adjusting screw before mentioned. This is attached to the side of the frame or other support and takes hold of the end of the first expansion band. At (i) is the safety spring and is shown as attached to the terminating link of expansion bands. At (a'') is represented the band from which the power is taken off for operating the ventilating door. It will now be seen that the spring (i) preserves the bands or other parts of the fastenings from risk of breakage should it happen that the screw (e) were turned so as to draw the bands too tightly for action in case of contraction taking place by the instrument being subjected to a lower temperature than was intended. The regulating screw also serves to enable the instrument to be set to open or close the vents at any required temperature.

I do not claim effecting the ventilation of buildings, &c., by operating the valves to the vents or air passages by the force derived from the expansion of metal, as this has been before proposed, but

What I do claim and desire to secure by Letters Patent is,

Having the valves or ventilating doors connected to the said metal bands about midway between their fixed supports so that the varying degrees of flexure shall effect the operation of opening or closing said doors in the manner and for the purpose herein described and shown.

Substantially as described.

I. P. TRIMBLE.

Witnesses:

I. P. PINSSON,  
S. H. MAYNARD.