Feb. 23, 1937. G. M. QUAVE 2,071,986

BELLOWS

Filed Feb. 7, 1936

Fig. 1.

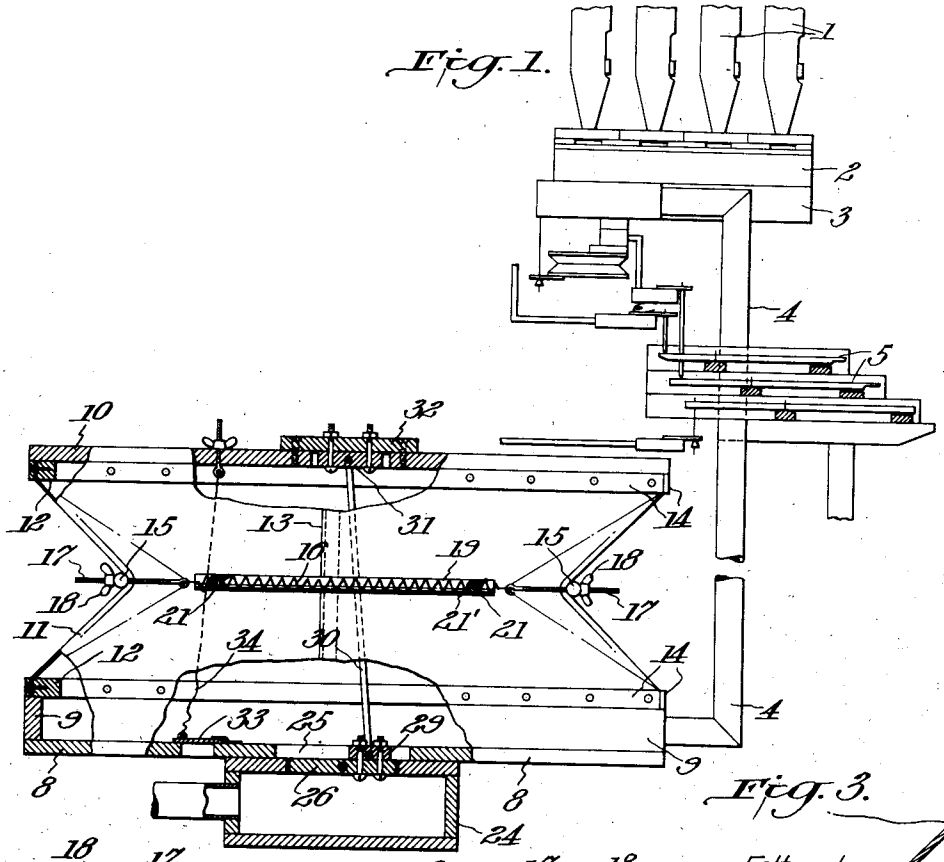
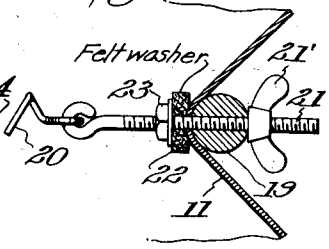


Fig. 3.



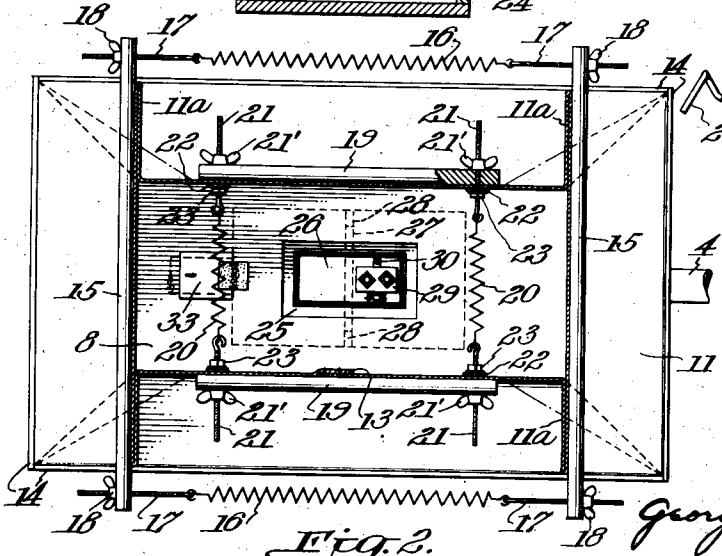


Fig. 2.

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BELLOWS

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4 Claims. (Cl. 137—156.5)

This invention relates to bellows constructions.

While the invention is capable of general application in the construction of various types of bellows, it is particularly well adapted to, and for purposes of illustration is shown and described as embodied in an organ bellows supplied with air from a blower and having its well connected to the mechanism to be supplied with air, such as the pipes of the organ. A valve is provided between the blower and the bellows to regulate the supply of air thereto.

An object of this invention is to provide a bellows of simple and economical construction.

Another object is to provide a bellows of relatively large size in which the flexible walls are formed of sheet material, or laminated sheet material, which has no reinforcement or stiffening material for restricting the flexing of the walls to predetermined areas.

More particularly, an object is to provide a bellows comprising a pair of spaced rigid wall members, a flexible wall which extends around and is joined to the edges of the rigid wall members, and two pairs of guide members that engage the mid-section of the flexible wall, the guide members of each pair being yieldingly urged towards each other to collapse the bellows.

These and other objects and advantages of the invention will be apparent from the following specification when taken with the accompanying drawing in which:

Fig. 1 is a somewhat schematic side elevation, with parts in section, of an embodiment of the invention; the bellows being shown in association with an intake box and a plurality of pipes of an organ;

Fig. 2 is a horizontal central section through the bellows;

Fig. 3 is a detail sectional view of one of the short side rods and the adjacent portion of the bellows wall.

In the drawing, the reference numeral 1 identifies a plurality of organ pipes which are stepped into the beam and slide assembly 2. The air supply to the pipes is through the wind chest 3 and trunk 4, and this supply is controlled in the usual manner by keys 5 or pedals, not shown. The parts so far described are or may be of any conventional design, as the exact construction is not a material part of this invention. The organ mechanism is shown to illustrate one use for this bellows.

The trunk 4 opens into the bellows or, more accurately, the bellows well section that comprises the rigid bottom wall 8 and the rigid side walls 9 of the bellows. The upper wall 10 of the bellows is rigid, and the flexible wall 11 could be attached directly to the edge of the top wall 10 and the side walls 9 but, preferably, the flexible section is attached to frames 12 that are fixed to the walls 9, 10. The flexible wall 11 is a rectangular strip of cloth or leather, or laminated cloth and leather, that may be treated to render it substantially airtight. This strip of material is readily affixed to the rigid portions of the bellows by setting the end walls or boards 8, 10 on edge and spaced apart by the width of the strip, and then progressively tacking the edges of the strip of material 11 around the edges of the frames 12. The ends of the strip are overlapped and formed to an air tight joint, by stitching 13 and glue or cement. The long edges of the strip are then glued or cemented to the frames and reinforcing or finishing strips 14 are nailed over the edges.

A pair of end rods 15 are applied at the medial lines of the end walls of the flexible material 11 and are drawn towards each other by springs 16 to collapse the bellows. The rods extend beyond the bellows to receive the eye bolts 17 that have wing nuts 18 for adjusting the tension of the springs. Shorter rods 19 are located at the center lines of the side wall sections and are connected by springs 20 which lie within the bellows and are supported by eye bolts 21 that have wing nuts 21'. Felt washers 22 are held against the inner face of the wall 11 by nuts 23 to form tight joints where the eye bolts 21 extend through the flexible material. Sections of the flexible wall are formed into folds 11^a which extend along the rods 15 beyond the active or frustro-pyramidal wall sections of the bellows. The flexing of the bellows wall is substantially restricted to the portions along or adjacent the rods 15, 19. The remaining sections of the flexible wall are not reinforced by boards or stiffening material, as has been customary in prior bellows of substantial size. The novel rod and spring arrangement for collapsing the bellows insures proper operation without any tendency towards a buckling or folding of the flexible material at points outside of the edge and the center line sections.

The bellows wall 8 should be secured to the wind box 24 in an air tight joint. Any conventional type of bellows valve may be used with this bellows. In the embodiment illustrated, the bottom wall 8 of the bellows is secured in an air tight joint to the wind box 24 and has a rectangular aperture 25 which is aligned with the smaller rectangular aperture of the wind box which car-

ries the valve. This valve comprises a block **26** pivoted on a rod **27**, the ends of which are held by plug **28**. Attached to block **26** by block **29** is a rod **30** which connects it through block **31** and board **32** to the lid **10**.

A safety valve **33**, of the usual flap type, is located at the lower bellows wall **8** and connected to the upper wall **10** by a cord **34**. Excessive pressures within the bellows will lift the top wall above its normal end position and thus draw upon the cord **34** to open the safety valve.

The normal operating pressure of the bellows is determined by the tension of the springs, and this may be adjusted when a pressure gauge is connected to the bellows. With the normal air supply to the bellows and none of the pipes playing, the wing nuts **18** are adjusted to bring the pressure, as read upon the gauge, to the desired value.

Small bellows have been formed with flexible walls that were initially creased or scored to determine the fold lines, but this construction has not been adapted for use in large bellows as the flexible walls would buckle, and frequently crack, along other lines. The invention is not restricted to any particular size but, as an example of typical constructions, it may be stated that the invention is well adapted for the construction of bellows of a capacity of many cubic feet.

It will be noted that the bellows construction is particularly economical, as compared with the usual type of large bellows in which the sections of the flexible wall are reinforced by or consist of flat boards. Reinforcement in the form of an extra thickness of the flexible wall material may be stitched to or glued over the joint sections but, even with such constructions, the cost of manufacture is substantially less than with the prior constructions in which rigid plates were necessary to restrict the flexing to the intended joint or flexure lines.

While I have described preferred embodiments of the invention, it is to be understood that there is considerable latitude in the exact construction of the several parts, their shapes and relative arrangements, and that various modifications can be made without departing from the spirit of my invention as set forth in the following claims.

I claim:

1. A bellows comprising a pair of opposed rigid walls, a wall of flexible material connected between said walls, a pair of rods engaging opposite sides of the flexible wall along the medial lines thereof, and spring means urging said rods towards each other to collapse said bellows.

2. A bellows as claimed in claim 1, in which said rigid walls are rectangular and a second set of rods engaging the other pair of opposed sides of said flexible wall, and spring means urging said second set of rods towards each other.

3. A bellows comprising opposed rigid frames of rectangular form, a substantially rectangular strip of flexible wall material having the edges thereof secured to the said opposed frames and the ends joined by an airtight joint, rods extending along the exterior of said flexible wall material and substantially parallel to the respective edges of the rectangular frames, and spring means urging the opposed pairs of rods towards each other to collapse the bellows.

4. A bellows comprising a pair of opposed rigid frames of rectangular form, an initially rectangular sleeve of freely flexible wall material of the order of airtight cloth or leather extending between said frames, a pair of parallel rods and springs urging the same towards each other and against opposite sides of the sleeve, and a second pair of parallel rods and springs urging the same towards each other and against the other sides of said sleeve, thereby to shape the initially rectangular sleeve to the form of a double frustro-pyramidal sleeve.

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