

PATENT SPECIFICATION

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COMPLETE SPECIFICATION.

Improvements in Pressure Regulators for Automatic Musical Instruments, Piano Players and the like.

We, M. WELTE & SÖHNE, G.M.B.H., of Freiburg, i/Baden, Germany, a company incorporated under the laws of Germany, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:

This invention comprises improvements in pressure regulators for automatic musical instruments, piano players and the like, which are operated pneumatically and either by pressure or suction. The object of this invention is to provide a regulator adapted for the instant altering either for increase or decrease of the pressure in the wind or suction chest, so that there may be immediate response to the exercise of the control.

According to the present invention, the regulator comprises a tone valuation or governor valve in combination with and adapted to control two regulator valves, one of which gives instant regulation for increase of pressure or suction, and the other for decrease of pressure or suction, these regulations being always in correspondence with the pressure as regulated by the tone valuation or governor valve.

The said regulator valves are advantageously under control of diaphragms, one regulator valve operating to open communication between a wind or suction chest and the atmosphere and the other operating to open communication between the supply and the wind or suction chest. For example, the diaphragms aforesaid may be disposed between the wind or suction chest and an auxiliary chest and the governor or tone valuation valve may be affected by a diaphragm between the auxiliary chest and the atmosphere.

In order to enable this invention to be readily understood reference is made to the accompanying drawing, in which two

constructions embodying these improvements are illustrated by way of example.

Figure 1 illustrates in vertical section a construction of regulator device adapted for use with suction.

Figure 2 illustrates in vertical section a construction of regulator device adapted for use with wind pressure.

In the two constructions, the device comprises three principal parts, namely, a tone valuation or governor valve A, a regulator valve B, and a second regulator valve C; also three chests or chambers D, E, F, the chamber D being connected with the wind or suction reservoir through the pipe D¹, the chamber E communicating with atmosphere through a restricted passage H which may be adjustable by means such as a screw H¹, and the chamber F being connected by the pipe F¹ with the instrument. The valve cone or disc v¹ of the valve A is seated in a port between the chamber D and the chamber E and disposed so that the constant suction or pressure in the chamber D tends to seat such valve against the tension of a spring G acting on the stem of the valve A. Also, the stem of the valve A is operatively connected with a diaphragm m¹ which is influenced by the difference between the pressure in the chamber E and the atmospheric pressure. The cone or disc v² of the valve B is seated in a port between the chambers D and F and also disposed so that the constant suction or pressure in the chamber D tends to seat it. The stem of the valve B is operatively connected with a diaphragm m² which is influenced by the difference between the pressures in the chambers E and F. The cone or disc v³ of the valve C is seated in a port between the chamber F and the atmosphere and is disposed so that the suction or pressure in the chamber F tends to seat it. The stem

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of the valve C is operatively connected with a diaphragm m^3 which also is influenced by the difference between the pressures in the chambers E and F. The valve B may be under the influence of a spring J tending to open it as seen in Figure 1, and the valve C may be under the influence of a spring K tending to close it also as seen in Figure 1. The spring G of the valve A is connected with either automatic or hand-operated means for varying its tension.

Referring now to Figure 1, suction is applied to the chest D through the pipe D^1 . If now the spring G be tensioned the valve v^1 rises from its seat and suction is applied to the chamber E and therefore to the lower surface of the diaphragm m^1 , so that the atmospheric pressure acting on the opposite side of m^1 , partly counteracts the effort of the spring. The reduced pressure in the chamber E also sucks up the diaphragm m^2 and opens the valve B so that suction is applied to the chamber F and to the instrument through the pipe F^1 . By further increasing the tension of the spring G the valve A is given increased opening so that the diaphragm m^2 immediately responds and increases the opening of the valve B. If the tension of the spring G is relaxed, the valve A moves towards its seat owing to the atmospheric pressure on the upper surface of the diaphragm m^1 . The greater pressure immediately prevailing in the chamber E then depresses the diaphragms m^2 m^3 thereby moving the valve B towards its seat for reducing the application of suction to the chamber F and moving the valve C from its seat for admitting atmospheric air to the chamber F. Immediately the pressures in the chambers E and F are equalized, the valve C closes. Thus, it will be seen that, for every adjustment of the spring G by the automatic or hand-operated regulating means, there is an instant and corresponding adjustment of the valve A and of the valve B or of the valves B and C, whereby the pressure in the conduit F^1 is made to correspond instantly with adjustments of the spring G.

Referring to Figure 2, pressure is applied to the chest D through the pipe D^1 . If now the spring G, be tensioned, the valve A will open for admission of pressure from the chamber D to the chamber E. The increased pressure in the chamber E then acts on the diaphragm m^1 to oppose the action of the spring G. This pressure also depresses the diaphragm m^2 for opening the valve B for admission of pressure to the chamber F and to the instrument through the pipe F^1 . Increased tensioning of the

spring G brings about increased opening of the valves A and B as will be readily understood, the pressures in the chambers E and F immediately equalizing after each regulatory adjustment. If the tension of the spring G, be relaxed, the valve A moves towards its seat and the pressure in the chamber E is instantly reduced so that the diaphragm m^2 is pressed upwardly for moving the valve B towards its seat to check the admission of pressure to the chamber E. Also, the diaphragm m^3 is pressed upwardly for lifting the valve C from its seat and instantly equalizing the pressures in the chambers E and F. Therefore, in order to equalize the pressure in the chamber F with the pressure in the chamber E, it is not necessary for wind, of higher pressure than is desired, to pass to the instrument, but the instant relief action of the valve C causes the supply to the instrument to be moderated practically at the moment of the exercise of the control on the spring G.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. Regulator device for automatic musical instruments, piano players and the like, distinguished by a governor or tone valuation valve controlling the action of two regulator valves in such a manner that one regulator valve regulates for instant increase of pressure or suction and the other regulator valve regulates for instant decrease of pressure or suction in the chest or chamber to be regulated in accordance with the adjustments of the governor or tone valuation valve.

2. Regulator device for automatic musical instruments, piano players and the like in accordance with Claim 1, further distinguished by the chamber in which the pressure is to be regulated having diaphragms arranged between it and an auxiliary chamber, such as E, one diaphragm being connected with one of the regulator valves for controlling communication between the atmosphere and the first chamber and the other diaphragm being connected with the second regulator valve for controlling communication between the suction or wind reservoir and the first chamber.

3. Regulator device for automatic musical instruments, piano players and the like in accordance with Claim 2, further distinguished by the governor or tone-valuation valve being connected with a diaphragm exposed to atmosphere on one side and to the pressure in the auxiliary chamber on the opposite side,

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the said valve controlling communication between the suction or wind reservoir and the auxiliary chamber. substantially as hereinbefore described with reference to the accompanying drawing.

4. The suction or pressure regulator
5 devices for automatic musical instruments, piano players and the like constructed and adapted for operation sub-

Dated this 9th day of December, 1921. 10

JENSEN & SON,
77, Chancery Lane, London, W.C. 2,
Chartered Patent Agents.

[This Drawing is a reproduction of the Original on a reduced scale]

