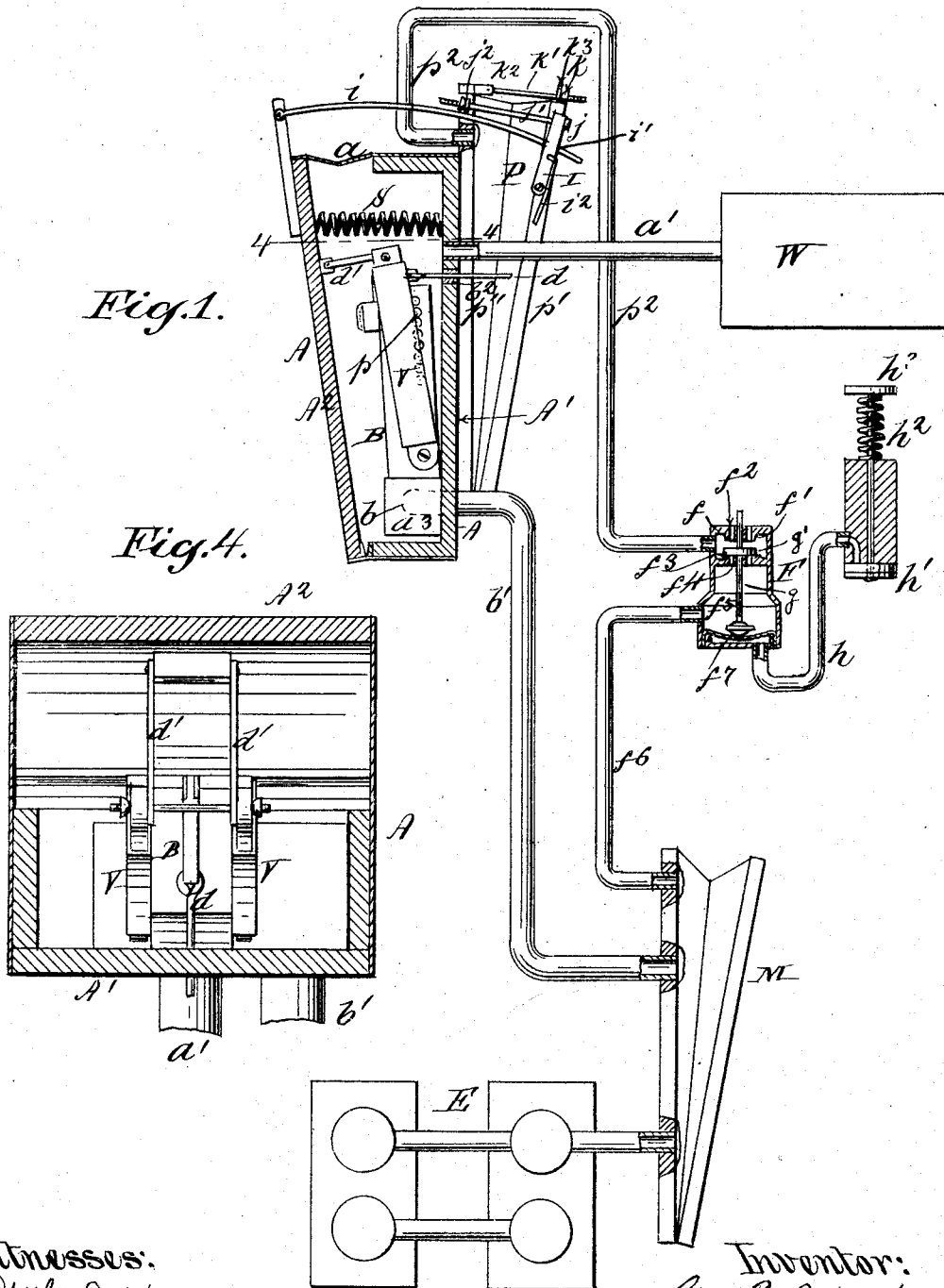


G. P. BRAND.
 ACCENTUATING MECHANISM FOR PNEUMATIC PLAYERS.
 APPLICATION FILED JAN. 16, 1906.

960,262.

Patented June 7, 1910.

4 SHEETS—SHEET 1.



Witnesses:
 D. W. Gardner.
 Julius Bierhab.

Inventor:
 Geo. P. Brand
 By his Attorney
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4 SHEETS—SHEET 2.

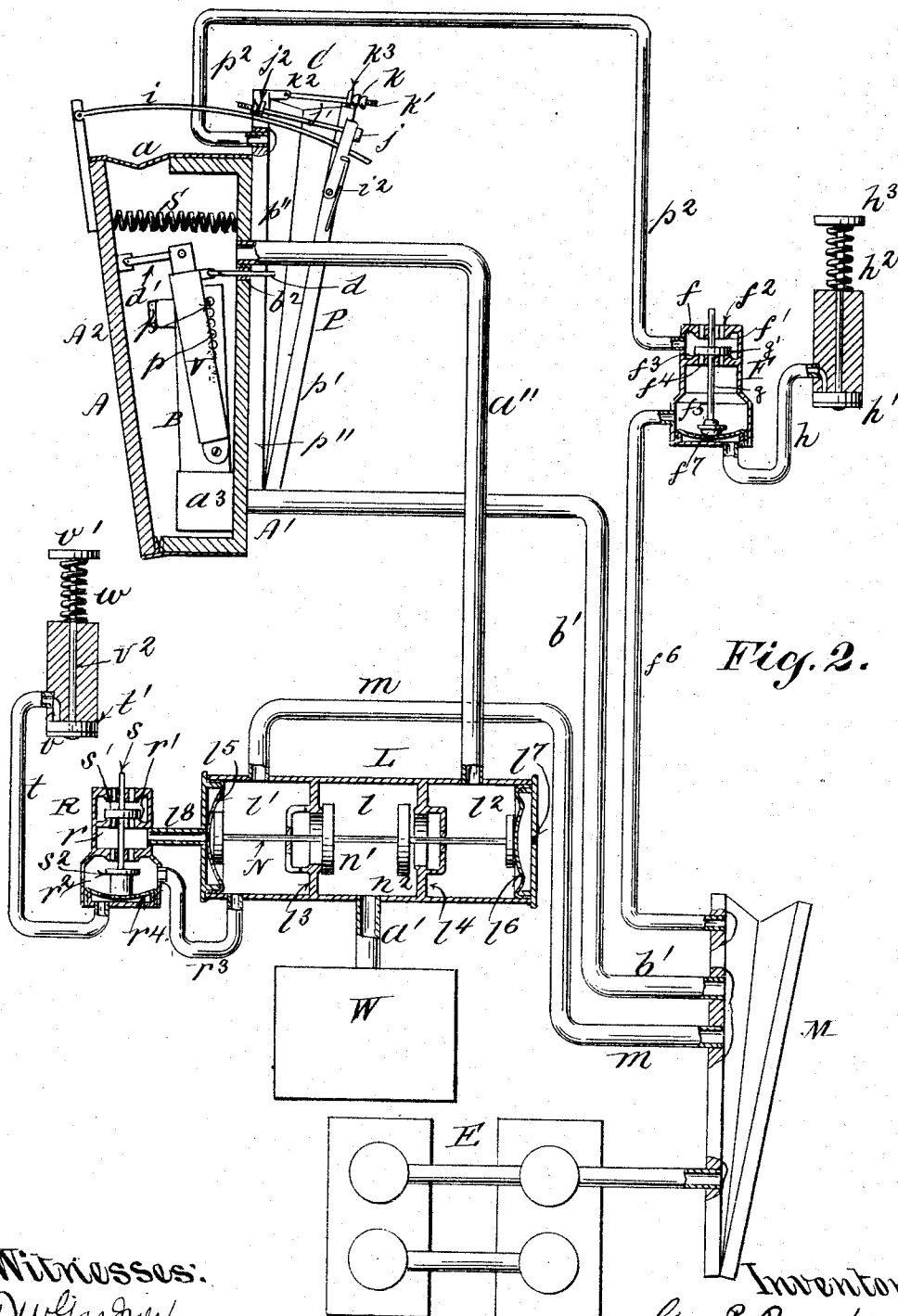


Fig. 2.

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4 SHEETS—SHEET 3.

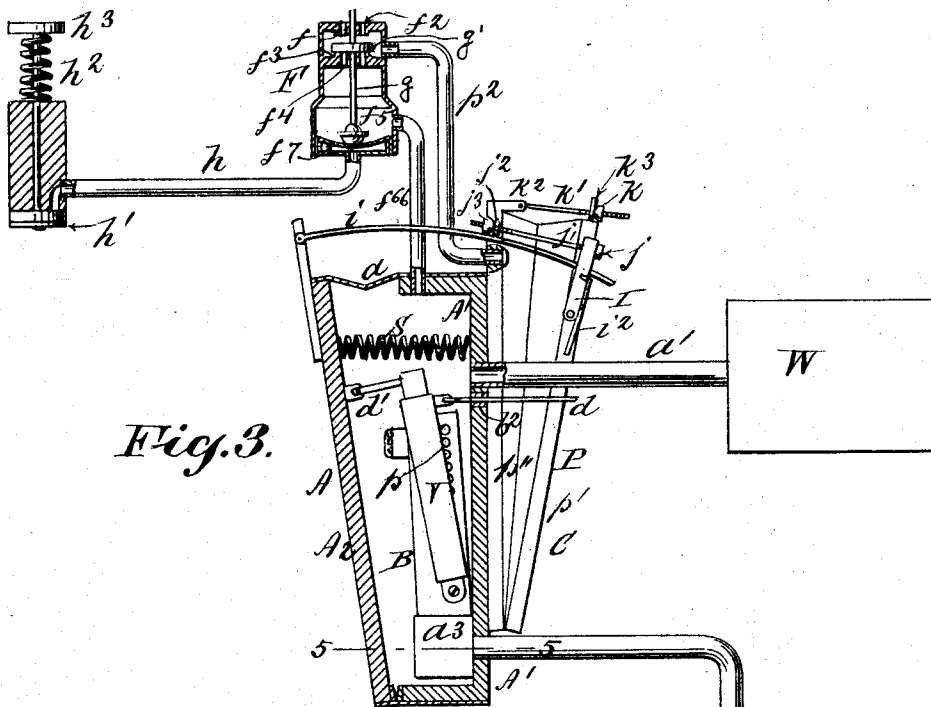


Fig. 3.

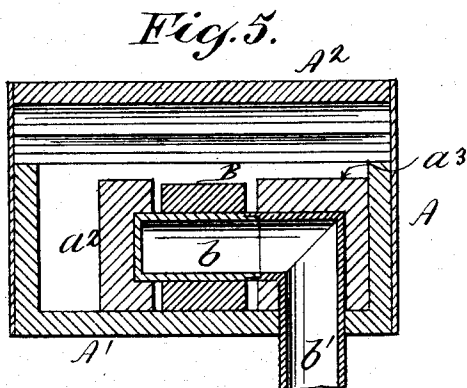
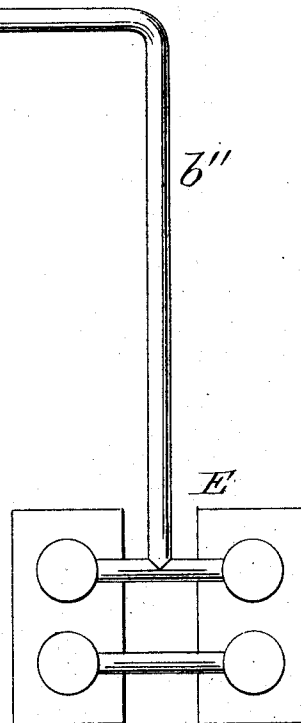


Fig. 5.



Witnesses:

D. W. Gardner
 Julius Binkhab

Inventor:

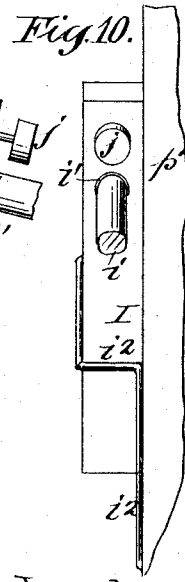
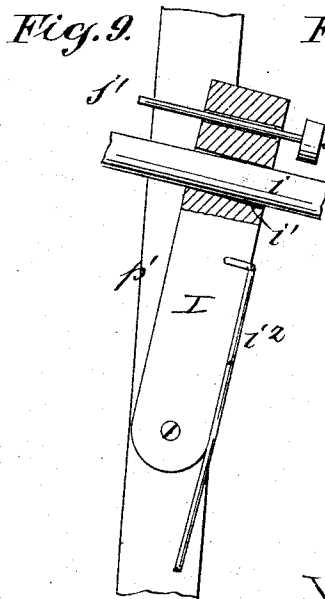
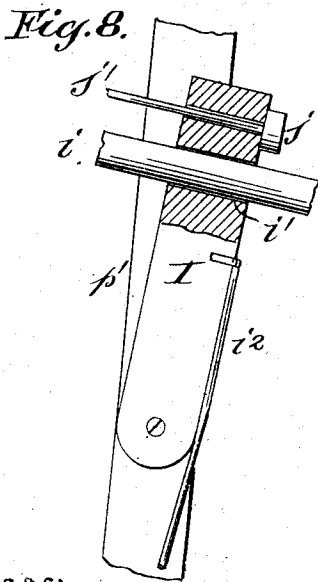
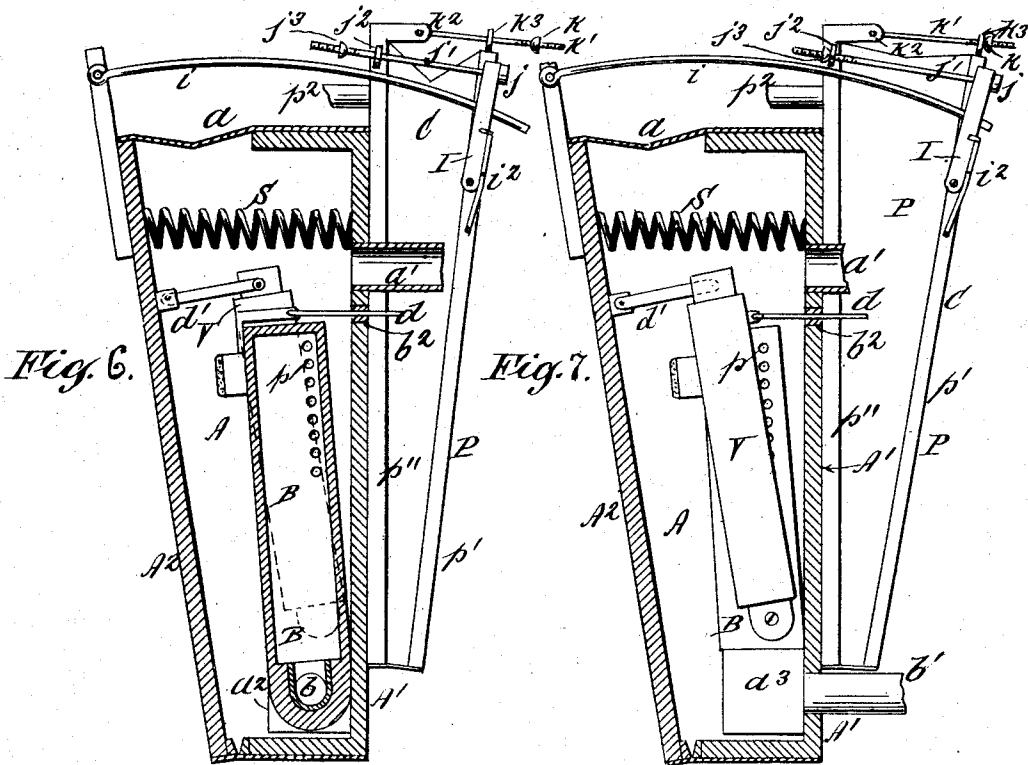
Geo. P. Brand
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4 SHEETS—SHEET 4.



Witnesses:
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UNITED STATES PATENT OFFICE.

GEORGE P. BRAND, OF NEW YORK, N. Y.

ACCENTUATING MECHANISM FOR PNEUMATIC PLAYERS.

960,262.

Specification of Letters Patent.

Patented June 7, 1910.

Application filed January 16, 1906. Serial No. 296,311.

To all whom it may concern:

Be it known that I, GEORGE P. BRAND, a citizen of the United States, residing in the borough of Bronx, city, county, and State of New York, have invented certain new and useful Improvements in Accentuating Mechanism for Pneumatic Players, of which the following is a specification.

My invention relates to pneumatic musical apparatus in which a variable tension pneumatic is employed having a throttle which controls communication between the exhaust mechanism and the wind chest with which the sound actuating pneumatics are connected, as set forth in my concurrent applications No. 202,543 filed April 11th, 1904, and No. 281,835 filed October 7th, 1905, both of which cases are designed to afford means whereby a so called normal tension or pressure in the wind chest may be set or regulated or varied temporarily, and whereby the degree of tension thus prescribed for the wind chest may be maintained automatically with a minimum degree of fluctuation from normal.

The essential and distinguishing feature of my present invention consists in combining with a variable tension bellows preferably but not necessarily, of the character designated an accentuating pneumatic and connections whereby resistance to the closing of the throttle in the variable tension bellows may be temporarily, but immediately and forcefully increased, so as to suddenly increase the tension in the wind chest by reason of the withdrawal therefrom of a greater proportion of air through the throttle by means of the exhaust mechanism for the purpose of accentuating certain notes in the music, as hereinafter more fully described and explained.

I have herein shown and described my accentuating pneumatic as arranged to operate in conjunction with the variable tension bellows set forth in my concurrent application No. 281,835 filed October 7th, 1905, which is a preferred combination of parts on account of the extent of motion available for the manipulation of the throttle, although I do not restrict myself to the use of this particular construction of variable tension bellows, provided the movable section of the bellows is connected with and actuates an internal throttle which controls communication between the wind chest and the exhaust mechanism.

My invention also includes the combination and arrangement with the wind chest, variable normal tension bellows, accentuating pneumatic, and exhaust mechanism, of certain pneumatic valves for actuating and controlling the parts in various ways to change the tension in the wind chest, as hereinafter described and claimed specifically.

One of the important and distinguishing advantages attained by my present invention is that I am enabled to control and vary the normal tension independent of the main tension reservoir, and at the same time effect accentuation which is directly proportionate and related to the existing normal tension.

In the accompanying drawings, Figure 1, shows diagrammatically the arrangement of parts when the variable normal tension bellows is connected with a main storage bellows interposed between it and the exhaust mechanism; Fig. 2, shows diagrammatically the arrangement of parts whereby the normal tension bellows may be cut off temporarily from communication with the wind chest, and the latter thrown into direct connection with the main storage or exhaust bellows; Fig. 3, shows diagrammatically a modification in which the exhaust is connected directly with the variable tension chamber; Fig. 4, is a sectional elevation upon an enlarged scale taken upon plane of line 4-4 Fig. 1; Fig. 5, is a sectional elevation upon an enlarged scale taken upon plane of line 5-5 Fig. 3; Fig. 6, is a sectional elevation showing the normal position of the variable tension bellows and the accentuating pneumatic; Fig. 7, is a sectional elevation illustrating the action of the accentuating pneumatic; Fig. 8, is a sectional detail of the clutch at rest; Fig. 9, is a similar view of the clutch in action; Fig. 10, is a rear view of the parts as shown in Fig. 8.

In the drawings W represents a wind chest of any desired construction with which the sound actuating pneumatics are connected,—said wind chest W being also in communication, either directly or indirectly, with the variable tension bellows A, the latter in turn communicating either directly or indirectly with the exhaust mechanism E. Thus, in the simpler arrangement shown in Fig. 3, the variable tension bellows A, is connected directly with the

exhaust mechanism E, while in Figs. 1 and 2, it is connected with a main storage bellows M interposed between it and the exhaust, E, the only difference being that in the arrangement illustrated in Fig. 2, provision is made for throwing the wind chest W into direct communication with the main storage of the exhaust when an unusually quick, full, and powerful accentuation is required.

In order to set forth an operative device and afford a clear understanding of the invention, it will be necessary to describe somewhat in detail the construction of the variable tension chamber A, although it forms the subject matter of a separate application for patent as hereinbefore stated. It consists essentially of a stationary member A', and a movable member A², the parts being united in the usual way by flexible material *a*. A long sensitive spring S, is interposed between the two members A' A², and tends constantly to separate them, even against internal tension. The interior of the variable tension bellows A is in all cases put in communication either directly, or through intervening conduits with the wind chest W (shown symbolically in the drawings) by means of a suitable air conduit or duct *a'*.

Pivotally attached to the stationary member A', of the bellows A, is an adjustable port block B, communicating through a hollow trunnion *b*, (see Fig. 5) upon which it is fulcrumed with an exhaust duct *b'*, which connects either directly with the exhaust mechanism E, as shown in Fig. 3, or indirectly therewith through the medium of the main storage or tension reservoir M, as shown in Figs. 1 and 2. The hollow trunnion *b*, is supported in the stationary bearing blocks *a*², *a*³, through the latter of which the exhaust duct extends. The sides of the port block B, are formed with the ports *p*, *p'*, and its position in the bellows is regulated and controlled manually or otherwise by means of a rod *d*, pivotally connected to the port block, and extending through a packed guide *b*², in the stationary member of the bellows. Pivotally secured to opposite sides of the adjustable port block B, are valve blades V, V, (see Fig. 4) which are also pivotally connected to the movable member A², of the bellows by means of the links *d'* *d'*. The sides of the valve blades V, V, opposed to the port block B are faced with leather or other packing to insure a close frictional contact therewith.

The adjustable port block B, being set (as in Fig. 6) to represent a prescribed degree of tension in the wind chest W, any air admitted to the latter through the note sounding pneumatics will inflate the bellows A, more or less and thereby cause the valve blades V, V, to increase the available area

of the ports *p*, proportionately, which will allow the tension reservoir M and exhaust mechanism E, to quickly withdraw such excess of air. As the prescribed normal tension is thus restored in the wind chest W the increase of tension in the bellows A, causes its movable member A², to collapse and close the ports *p*, more or less, according to the difference in tension existing in the tension reservoir M or exhaust mechanism E, as compared with that in the wind chest. Thus the tension in the main storage reservoir M or exhaust mechanism E, being greater than in the wind chest the movable member A², of the variable normal tension bellows A will move toward the stationary member A', sufficiently to cause the valve blades V, V, to close the ports *p*, entirely until air admitted to the wind chest W as before stated again reduces the degree of tension therein, and allows the movable member A², of the bellows A to move away from the stationary member A', under the action of the spring S, and these pulsations will be repeated continuously and automatically during the operations of the apparatus,—the number and extent of the fluctuations being dependent upon the character and requirements of the music executed. This much for the functions and operations of the variable tension bellows under ordinary conditions when set to a prescribed normal tension by means of the adjustable port block through the medium of the rod *d*.

When it is desirable to temporarily and quickly increase the tension in the bellows A, without resorting to or disturbing the adjustment of the port block B which it is expedient to maintain for the time being at a prescribed normal or general expression tension, I increase the tension in the interior of the bellows A, and hence in the wind chest W by increasing the opposition to the collapse of the movable member A², inward by means of auxiliary pressure applied externally to said movable member A², thereby preventing the valve blades V, V, from reducing the area of the ports in the block B,—the object being to accentuate particular notes in the music under execution. It is true that the result might be attained in a certain degree by the manipulation of the adjustable port block B, by means of the rod *d*, but this would disturb the prescribed or desired normal or expression tension, to which the port block would have to be readjusted. Hence I employ an auxiliary device which will temporarily, but quickly, increase the tension without disturbing the conditions by which the normal tension is maintained for the time being, and this auxiliary device and connections I designate as an accentuator C, which consists essentially of a pneumatic P the movable member *p'*, of which is coupled to the movable mem-

ber A² of the normal tension bellows A, in such manner that when the pneumatic P is deflated, atmospheric pressure will be utilized in forcing the movable member A², of the normal tension bellows outward to cause the valve blades V, to increase the area of the valve ports as before stated.

The stationary member p'', of the accentuating pneumatic may be attached directly to the stationary member A', of the normal tension bellows A or to any adjacent stationary support, as may be found necessary or most convenient, provided it is in sufficiently close proximity to the normal tension bellows A to admit of the movable member p'' being coupled to the movable member (A²) thereof substantially as hereinafter set forth. The interior of the accentuating pneumatic P is normally in communication with the atmosphere through the medium of an air duct p², which enters the air chamber f, in the valve chest F, said air chamber f, being formed with a valve seat f', through which extend ports f², communicating with the atmosphere. In the air chamber f, is also another valve seat f³, formed with ports f⁴, communicating with a tension chamber f⁵, connected by a duct f⁶, with the main storage tension reservoir M, as in Figs. 1 and 2, or directly with the variable normal tension bellows A by a duct f^{6a} as shown in Fig. 3, which variable tension bellows in this arrangement of parts performs the function of a main storage tension as well as that of a normal tension chamber owing to the fact that it controls and throttles communication between the wind chest W and the exhaust mechanism E directly, instead of indirectly through the main storage tension chamber M.

The disk valve g', on the rod g, rests normally on the seat f³, thus closing communication with the main tension storage. The lower end of the valve rod g, rests upon a diaphragm f', in the lower part of the tension chamber f⁵, the space beneath said diaphragm f', being connected by a duct h, with an air valve h', held normally against its seat by a spring h², interposed between a stationary part and the head or push button h³. When it is desired to partly deflate the pneumatic P to accentuate certain notes of the music, the button h³, is depressed against the resistance of the spring h², thereby admitting air underneath the diaphragm f', which, owing to the tension in the chamber f⁵, acts on the rod g, to raise the valve g', from the seat f³, and press it against the seat f', thereby closing the air ports f², while opening the ports f⁴, in the seat f³. As a result the air is withdrawn from the pneumatic P through the duct p², chamber f, ports f⁴, chamber f⁵, duct f⁶, or f^{6a} main storage tension reservoir M (or through the variable tension chamber A act-

ing as a tension reservoir) and exhaust mechanism E. When the finger button is released, the spring h², immediately returns the valve h', to its seat, closing off the supply of air from beneath the diaphragm f', which is formed with a bleed hole through which the air escapes into the tension chamber f⁵, the exhaust being sufficient to compensate for any leak through the bleed hole when the diaphragm is inflated. The collapse of the diaphragm f', lowers the valve g', to the seat f³, shutting off communication between the tension chamber f⁵, and the air chamber f, and admitting air to the latter, and thence to the interior of the pneumatic P, which is again inflated.

The inward thrust of the movable member p', of the actuating pneumatic P, is imparted to the movable member A², of the variable normal tension bellows through the medium of a coupling rod i, pivotally connected to the movable member A², of the bellows A, and extending through and slidable within a hole i', in the clutch I which in turn is pivotally connected to the movable member p', of the accentuating pneumatic P. The diameter of the aperture i', is very little larger than the diameter of the rod i, and the curvature of the rod i, is such that when the pneumatic P is inflated and at rest as shown in Figs. 1, 2, 3 and 6, the rod is free to move back and forth through the clutch I to adapt itself to the changes in position of the movable member A², of the bellows A, under the variations in tension caused by the music sounding pneumatics connected with the wind chest W. Immediately however upon the beginning of the partial deflation of the accentuating pneumatic P as hereinbefore described, the clutch I by reason of its pivotal connection with the movable member p', of the pneumatic, pinches or clamps the portion of the rod i, in engagement with the hole i', as shown in Fig. 9. This pinching action is insured by means of a spring i², which tends constantly to rock the clutch I backward on its pivot and into rigid engagement with the rod i, this tendency being counteracted when the pneumatic A is inflated and the parts are at rest, by a stop j, which engages the upper end of the clutch I and sustains it in such position that the sides of the hole i', have little or no bearing upon the rod i, which is thus free to move back and forth without actual engagement with the pneumatic P. The stop j which uncouples the rod i, from the clutch I is adjustable so as to regulate its action with relation to the position of the stop k, which limits the outward thrust of the movable member p', of the pneumatic P, said stop k, being also adjustable so that the pneumatic P may be set to a prescribed degree of inflation. Thus the stop k, being set to determine the limit of outward play

or movement of the movable member p , of the pneumatic P, the stop j , is then set to trip or release the catch I at the end of such movement. In other words the stops j and k , act simultaneously and in conjunction with each other, the stop k , relieving the stop j and clutch I of all strain while the parts are at rest. It is obvious that either or both of these stops j and k may be adjustably mounted upon any suitable stationary support adjacent to the pneumatic P and I do not limit myself to the arrangement of parts shown, in which the stop k consists of a nut on a screw k' , which is pivotally connected to a lug piece k^2 , attached to the stationary member p , of the pneumatic P said nut bearing against a lug or extension k^3 , on the movable section p' , of said pneumatic P, while the stop j , is carried upon a rod j' , the inner end of which is threaded, and passes through an eye or bearing j^2 , on the stationary member of the pneumatic where it engages with a nut j^3 , by which the position of the stop j , may be regulated with relation to the said stationary member p , and hence with relation to the stop k , as above set forth. It will thus be seen that whenever the pneumatic P is partially deflated the pressure of the atmosphere exerted against its movable member p , will be suddenly transmitted to the movable member A^2 , of the bellows A, in such manner as to cause the valve blades V, V, to immediately increase the available port area, with the result that there is an instantaneous increase of tension in the wind chest W for the purpose set forth, which however drops back to the prescribed normal tension as soon as the actuating pneumatic P is again inflated.

My auxiliary accentuating device is adapted for practical application and use in various ways. That shown in Fig. 3, is an illustration of one of the simplest, in which the tension chamber f^5 is connected directly with the variable normal tension bellows A through the medium of the conduit f^{60} , which is the equivalent of the conduit f^6 , shown in Fig. 1, the adjustable port block B in said bellows A, being in turn directly connected with the exhaust mechanism E through the medium of the duct b' , which is the equivalent of the duct b' , in Fig. 1, the results in all respects in both arrangements being essentially the same in that the accentuating pneumatic P acts to create a temporary but decided increase of tension within the wind chest W. The arrangement shown in Fig. 2, is not materially different from the others, the main distinction being that provision is made for ordinary accentuation by means of the pneumatic A, but also for extraordinary or very powerful accentuation when desired by means which admit of the wind chest W being thrown temporarily into direct communication with the

main tension storage reservoir M. This I accomplish by connecting the wind chest duct a' , with the middle chamber l , of a valve chest L, having end chambers l' , and l^2 , connected respectively by means of the duct m , with the main storage tension reservoir M, and by means of the duct a'' , with the variable normal tension bellows A. The partitions l^3 , and l^4 , which divide the chest L into three compartments l , l' , l^2 , are each formed with ports and valve seats opening into the central compartment l . These ports are closed alternately by valves n' , n^2 , on a rod N the opposite ends of which abut against diaphragms l^5 , l^6 . The space back of the diaphragm l^6 , communicates with the atmosphere through a hole l^7 , in the end of the chest L, and the space back of the other diaphragm l^5 , communicates through a duct l^8 , with a middle chamber r , in a secondary valve chest R, which is formed with an air chamber r' , connecting with the atmosphere and with a tension chamber r^2 , communicating through the duct r^3 , with the tension chamber l' , in the valve chest L. In the lower part of the chamber r^2 , is a diaphragm r^4 , upon which rests the lower end of a valve stem s , said stem carrying two valves s' , and s^2 , arranged respectively to engage alternately with seats in the partitions which separate the middle chamber r , from the others. The space under the diaphragm r^4 , communicates through the duct t , with the valve seat t' , upon which the valve v , is held normally by the spring w , interposed between a stationary part and the finger button v' , on the upper end of the valve stem v^2 . In Fig. 2, the parts are shown in their normal positions with relation to each other in which condition the wind chest W is in communication with the variable tension bellows A, and the ordinary requirements of accentuation are met by the use of the pneumatic P to increase the tension within the said bellows A. When unusually sudden and powerful accentuation is desired, the valve h' , is depressed against the resistance of the spring h^2 , by means of the finger button h^3 , thus admitting air through the duct h , to the underside of the diaphragm f^7 , which thereupon raises the valve stem until the valve f^3 , rests against the seat f' . Consequently the interior of the pneumatic P is put in communication with the wind chest W through the medium of the conduit a' , tension chamber A, duct f^{60} , and chamber f^5 , thereby tending to deflate the pneumatic P and cause the clutch I to act on the rod i , to force the movable member A^2 , of the tension bellows A back, to increase the tension within said bellows A.

The bellows A for convenience of description may be called a variable tension expression bellows, as in my concurrent application No. 281,835 filed Oct. 7, 1905, and

I so designate it in the accompanying claims. Certain features herein shown and claimed are shown but not claimed in my co-pending application Serial No. 381,418.

5 What I claim as my invention and desire to secure by Letters Patent is,

1. In pneumatic apparatus of the character designated, the combination with the wind chest and exhaust mechanism and
10 ducts leading thereto from a variable tension bellows, of said variable tension bellows, having an internal throttle interposed between a duct leading to the exhaust mechanism and a duct leading to the
15 wind chest, said throttle being controlled by the movable member of said bellows, an auxiliary accentuating pneumatic, means for inflating and deflating the latter, and means for coupling its movable member to the
20 movable member of the said variable tension bellows when said accentuating pneumatic is deflated, for the purpose described.

2. In pneumatic apparatus of the character designated, the combination with the
25 wind chest and exhaust mechanism and ducts leading thereto from a variable tension bellows, of said variable tension bellows, having an internal throttle interposed between a duct leading to the exhaust mechanism and a duct leading to the wind chest,
30 said throttle being controlled by the movable member of said bellows, an auxiliary accentuating pneumatic, means for inflating and deflating the latter, a coupling rod pivotally connected to the movable member of
35 the said variable tension bellows and slidable in a clutch on the movable member of the accentuating pneumatic, and said clutch arranged to automatically pinch and hold the coupling rod rigidly during the deflation of the accentuating pneumatic, for the purpose described.

3. In pneumatic apparatus of the character designated, the combination with the
45 wind chest and exhaust mechanism and ducts leading thereto from a variable tension bellows, of said variable tension bellows, having an internal throttle interposed between a duct leading to the exhaust mechanism and a duct leading to the wind chest,
50 said throttle being controlled by the movable member of said bellows, an auxiliary accentuating pneumatic, means for inflating and deflating the latter, a coupling rod pivotally connected to the movable member of
55 said variable tension bellows and slidable in a clutch on the accentuating pneumatic said clutch pivotally connected to the movable member of the accentuating pneumatic and formed with an aperture for the reception of the coupling rod, said aperture being of approximately the same width as the diameter of the coupling rod, a spring which tends constantly to cause the clutch to pinch
60 the coupling rod, and a stop arranged to

disconnect the clutch from the rod when the accentuating pneumatic is inflated, for the purpose described.

4. In pneumatic apparatus of the character designated, the combination with the
70 wind chest and exhaust mechanism and ducts leading thereto from a variable tension bellows, of said variable tension bellows, having an internal throttle interposed between a duct leading to the exhaust mechanism and a duct leading to the wind chest,
75 said throttle being controlled by the movable member of said bellows, an auxiliary accentuating pneumatic, means for inflating and deflating the latter, a coupling rod pivotally connected to the movable member of
80 said variable tension bellows and slidable in a clutch on the accentuating pneumatic, said clutch pivotally connected to the movable member of the accentuating pneumatic and formed with an aperture for the reception of the coupling rod, said aperture being of approximately the same width as the diameter of the coupling rod, a spring which tends constantly to cause the clutch to pinch
85 the coupling rod, and a stop arranged to disconnect the clutch from the rod when the accentuating pneumatic is inflated, and means for adjusting said stop with relation to the stationary member of the accentuating
90 pneumatic for the purpose described.

5. In pneumatic apparatus of the character designated, the combination with the
100 wind chest and exhaust mechanism and ducts leading thereto from a variable tension bellows, of said variable tension bellows, having an internal throttle interposed between a duct communicating with the exhaust mechanism and a duct communicating with the
105 wind chest, said throttle being controlled by the movable member of said bellows, a coupling rod pivotally connected to the movable member of said variable tension bellows and slidable in a clutch on an accentuating
110 pneumatic, said accentuating pneumatic, said clutch pivotally connected to the movable member of the accentuating pneumatic and formed with an aperture for the reception of the coupling rod, said aperture
115 being of approximately the same width as the diameter of the coupling rod, a spring which tends constantly to cause the clutch to pinch the coupling rod, a stop arranged to limit the outward movement of the movable member of the accentuating pneumatic when
120 inflated, and a stop arranged to disconnect the clutch from the coupling rod when the movable member of the accentuating pneumatic encounters the said first mentioned stop, for the purpose described. 125

6. In pneumatic apparatus of the character designated, the combination with the
130 wind chest and exhaust mechanism and ducts leading thereto from a variable tension bellows, of said variable tension bellows, having

an internal throttle interposed between a duct communicating with the exhaust mechanism and a duct communicating with the wind chest, said throttle being controlled by the movable member of said bellows, a coupling rod pivotally connected to the movable member of said variable tension bellows and slidable in a clutch on an accentuating pneumatic, said accentuating pneumatic, said clutch pivotally connected to the movable member of the accentuating pneumatic and formed with an aperture for the reception of the coupling rod, said aperture being of approximately the same width as the diameter of the coupling rod, a spring which tends constantly to cause the clutch to pinch the coupling rod, an adjustable stop arranged to limit the outward movement of the movable member of the accentuating pneumatic when inflated and an adjustable stop arranged to disconnect the clutch from the coupling rod when the movable member of the accentuating pneumatic encounters the said first mentioned adjustable stop, for the purpose described.

7. In pneumatic apparatus of the character designated the combination with the wind chest, and exhaust mechanism, and with a variable tension bellows communicating with the wind chest and having an adjustable port block communicating with the exhaust mechanism and pivotally mounted upon the stationary member of the bellows, and a pivoted valve plate linked to the movable member of the bellows, of an auxiliary accentuating pneumatic, means for inflating and deflating the latter, and means for coupling its movable member to the movable member of the said variable tension bellows when said accentuating pneumatic is deflated, for the purpose described.

8. In pneumatic apparatus of the character designated the combination with the wind chest, and exhaust mechanism, and with a variable tension bellows communicating with the wind chest and having an adjustable port block communicating with the exhaust mechanism and pivotally mounted upon the stationary member of the bellows, and a pivoted valve plate linked to the movable member of the bellows, of an auxiliary accentuating pneumatic means for inflating and deflating the latter, a coupling rod pivotally connected to the movable member of the said variable tension bellows and slidable in a clutch on the movable member of the accentuating pneumatic, and said clutch arranged to automatically pinch and hold the coupling rod rigidly during the deflation of the accentuating pneumatic, for the purpose described.

9. In pneumatic apparatus of the character designated, the combination with the wind chest, and exhaust mechanism, and with a variable tension bellows communi-

cating with the wind chest and having an adjustable port block communicating with the exhaust mechanism and pivotally mounted upon the stationary member of the bellows, and a pivoted valve plate linked to the movable member of the bellows of an auxiliary accentuating pneumatic, means for inflating and deflating the latter, a coupling rod pivotally connected to the movable member of said variable tension bellows and slidable in a clutch on the accentuating pneumatic, said clutch pivotally connected to the movable member of the accentuating pneumatic and formed with an aperture for the reception of the coupling rod, said aperture being of approximately the same width as the diameter of the coupling rod, a spring which tends constantly to cause the clutch to pinch the coupling rod, and a stop arranged to disconnect the clutch from the rod when the accentuating pneumatic is inflated for the purpose described.

10. In pneumatic apparatus of the character designated, the combination with the wind chest, and exhaust mechanism, and with a variable tension bellows communicating with the wind chest and having an adjustable port block communicating with the exhaust mechanism and pivotally mounted upon the stationary member, of the bellows, and a pivoted valve plate linked to the movable member of the bellows, of an auxiliary accentuating pneumatic, means for inflating and deflating the latter, a coupling rod pivotally connected to the movable member of said variable tension bellows and slidable in a clutch on the accentuating pneumatic, said clutch pivotally connected to the movable member of the accentuating pneumatic and formed with an aperture for the reception of the coupling rod, said aperture being of approximately the same width as the diameter of the coupling rod, a spring which tends constantly to cause the clutch to pinch the coupling rod, and a stop arranged to disconnect the clutch from the rod when the accentuating pneumatic is inflated, and means for adjusting said stop with relation to the stationary member of the accentuating pneumatic, for the purpose described.

11. In pneumatic apparatus of the character designated, the combination with the wind chest, and exhaust mechanism, and with a variable tension bellows communicating with the wind chest and having an adjustable port block communicating with the exhaust mechanism and pivotally mounted upon the stationary member of the bellows, and a pivoted valve plate linked to the movable member of the bellows, of an auxiliary accentuating pneumatic, means for inflating and deflating the latter, a coupling rod pivotally connected to the movable member of said variable tension bellows and slidable in a clutch on the accentuating pneumatic,

said clutch pivotally connected to the movable member of the accentuating pneumatic and formed with an aperture for the reception of the coupling rod, said aperture being
 5 of approximately the same width as the diameter of the coupling rod, a spring which tends constantly to cause the clutch to pinch the coupling rod, a stop arranged to limit the outward movement of the movable member of the accentuating pneumatic when inflated, and a stop arranged to disconnect the clutch from the coupling rod when the movable member of the accentuating pneumatic encounters the said first mentioned stop, for
 10 the purpose described.

12. In pneumatic apparatus of the character designated the combination with the wind chest, and exhaust mechanism, and with a variable tension bellows communicating with the wind chest and having an adjustable port block communicating with the exhaust mechanism and pivotally mounted upon the stationary member of the bellows, and a pivoted valve plate linked to the movable member of the bellows, of an auxiliary accentuating pneumatic, means for inflating and deflating the latter, a coupling rod pivotally connected to the movable member of said variable tension bellows and slidable
 20 in a clutch on the accentuating pneumatic, said clutch pivotally connected to the movable member of the accentuating pneumatic and formed with an aperture for the reception of the coupling rod, said aperture being
 25 of approximately the same width as the diameter of the coupling rod, a spring which tends constantly to cause the clutch to pinch the coupling rod, an adjustable stop arranged to limit the outward movement of the movable member of the accentuating pneumatic when inflated, and an adjustable stop arranged to disconnect the clutch from the coupling rod when the movable member of the accentuating pneumatic encounters the said first mentioned adjustable stop, for
 30 the purpose described.

13. In pneumatic apparatus of the character designated the combination with the wind chest and exhaust mechanism and ducts
 35 leading thereto from a variable tension bellows, of said variable tension bellows, having an internal throttle interposed between the ducts leading to the exhaust mechanism and a duct leading to the wind chest, said throttle being controlled by the movable member of the said bellows, an auxiliary accentuating pneumatic, means for inflating and deflating the latter, means for coupling the movable member of the variable tension
 40 bellows to the movable member of the accentuating pneumatic when the latter is deflated, and means for simultaneously closing communication between said variable tension bellows and the wind chest and putting the

latter in direct communication with the exhaust mechanism, for the purpose described. 65

14. In pneumatic apparatus of the character designated the combination with the wind chest, and exhaust mechanism, and with a variable tension bellows communicating with the wind chest and having an adjustable port block communicating with the exhaust mechanism and pivotally mounted upon the stationary member of the bellows, and a pivoted valve plate linked to the movable member of the bellows, of an auxiliary accentuating pneumatic, and means for simultaneously closing communication between said variable tension bellows and the wind chest and putting the latter in direct
 70 communication with the exhaust mechanism for the purpose described. 80

15. In pneumatic apparatus for the purpose designated, the combination of a variable tension bellows, an auxiliary accentuating pneumatic, means for inflating and deflating the latter, and means for coupling its movable member to the movable member of the said variable tension bellows when said accentuating pneumatic is deflated, for
 85 the purpose described. 90

16. In pneumatic apparatus for the purpose designated, the combination of a variable tension bellows an auxiliary accentuating pneumatic, means for inflating and deflating the latter, a coupling rod pivotally connected to the movable member of the said variable tension bellows and slidable in a clutch on the movable member of the accentuating pneumatic, and said clutch arranged
 95 to automatically pinch and hold the coupling rod rigidly during the deflation of the accentuating pneumatic for the purpose described. 100

17. In pneumatic apparatus for the purpose designated, the combination of a variable tension bellows, mechanical means for regulating the tension therein, an auxiliary accentuating pneumatic, means for inflating and deflating the latter, and means for coupling
 105 its movable member to the movable member of the said variable tension bellows when said accentuating pneumatic is deflated, for the purpose described. 110

18. In pneumatic apparatus for the purpose designated, the combination of a variable tension bellows, an auxiliary accentuating pneumatic, means for inflating and deflating the latter, a coupling rod pivotally connected to the movable member of the said variable tension bellows and slidable in a clutch on the movable member of the accentuating pneumatic, and said clutch arranged to automatically pinch and hold the coupling rod rigidly during the deflation of
 115 the accentuating pneumatic, for the purpose described. 120

19. The combination of a wind chest, a 125

main tension reservoir, a variable tension bellows connected therewith and with the wind chest, mechanical means in conjunction with said variable tension bellows for
 5 producing the desired normal tension in the wind chest, an auxiliary accentuating pneumatic, means for inflating and deflating the latter, and movable clutch means for coupling the movable member of the variable
 10 tension bellows with the movable member of the auxiliary accentuating pneumatic when the latter is deflated.

20. The combination with a variable tension bellows and an auxiliary bellows normally disconnected therefrom, of mechanical means for connecting the auxiliary bellows with the variable tension bellows at any position of the movement of the latter.

21. In pneumatic apparatus for the purpose designated, the combination of a variable tension expression bellows, a port block mounted adjustably upon one member of said bellows, means for connecting said adjustable port block with a tension reservoir or exhaust mechanism, a valve blade connected with the other member of the bellows, means for adjusting said port block with relation to said valve blade, means for connecting the interior of the bellows with
 30 a working tension wind chest, an auxiliary accentuating pneumatic, means for inflating and deflating the latter, and means for coupling its movable member to the movable member of said variable tension expression bellows when said auxiliary accentuating pneumatic is deflated for the purpose described.

22. In pneumatic apparatus for the purpose designated, the combination of a variable tension expression bellows, a port block mounted adjustably upon one member of said bellows, means for connecting said adjustable port block with a tension reservoir or exhaust mechanism, a valve blade connected with the other member of the bellows, means for adjusting said port block with relation to said valve blade, means for connecting the interior of the bellows with a working tension wind chest, an auxiliary
 50 accentuating pneumatic, means for inflating and deflating the latter, a coupling rod pivotally connected to the movable member of the variable tension expression bellows and slidable in a clutch on the movable member
 55 of the auxiliary accentuating pneumatic, and said clutch arranged to automatically pinch and hold the coupling rod rigidly during the deflation of said accentuating pneumatic, for the purpose described.

23. In pneumatic apparatus of the character designated the combination of a variable tension expression bellows, a port block mounted adjustably upon one member of the bellows, means for connecting said port block
 65 with a tension reservoir or exhaust mechanism,

a valve blade pivotally connected with the other member of the bellows and pivotally connected to the adjustable port block, means for adjusting said port block with relation to said valve blade, a spring tending constantly to separate the members of the bellows, means for connecting the interior of the bellows with a working tension wind chest, an auxiliary accentuating pneumatic, means for inflating and deflating the latter, a coupling rod pivotally connected to the movable member of the variable tension expression bellows and slidable in a clutch on the movable member of the auxiliary accentuating pneumatic, and said clutch arranged to automatically pinch and hold the coupling rod rigidly during the deflation of said accentuating pneumatic, for the purpose described.

24. In pneumatic apparatus of the character designated the combination of a variable tension expression bellows, a hollow movable port block formed with ports in its opposite side walls and supported on one member of the bellows, a hollow fulcrum upon which the said port block is mounted communicating with a tension reservoir or exhaust mechanism, valve blades linked to the other member of the bellows and pivotally connected to opposite sides of the said adjustable port block, means for adjusting the said port block with relation to the said valve blades, means which tend constantly to separate the members of the bellows, means for connecting the interior of the bellows with
 100 a working tension wind chest, an auxiliary accentuating pneumatic, means for inflating and deflating the latter, a coupling rod pivotally connected to the movable member of the variable tension expression bellows and slidable in a clutch on the movable member of the auxiliary accentuating pneumatic, and said clutch arranged to automatically pinch and hold the coupling rod rigidly during the deflation of said accentuating
 110 pneumatic, for the purpose described.

25. The combination with a variable tension bellows, of means for varying the tension, means for controlling the tension, a pneumatic and clutch means operable in conjunction therewith for the purposes of accentuation.

26. The combination with a variable tension bellows, of means for varying the tension, means for controlling the tension, a pneumatic and automatic additional clutch means for the purposes of accentuation, all operating in conjunction with said bellows.

27. The combination with a variable tension bellows, of means for varying the tension, means for controlling the tension in said bellows, and clutch-controlled means for the purposes of accentuation.

28. The combination with a variable tension pneumatic, and means for varying the
 130

tension, of an accentuating pneumatic, and a clutch device normally inoperative but operable in consequence of the deflation of the accentuating pneumatic to operatively connect the latter with the tension pneumatic.

29. A variable tension bellows, an auxiliary bellows, each having a movable member, and means carried by one of said mem-

bers and normally movable independent of the other member to connect said members to move together at any predetermined set position of the variable tension bellows. 10

GEORGE P. BRAND.

Witnesses:

D. W. GARDNER,
GEO. WM. MIATT.