J. C. HAGEY.

AUTOMATIC MUSICAL INSTRUMENT.

APPLICATION FILED SEPT. 27, 1905.

955,869.

Patented Apr. 26, 1910.

3 SHEETS—SHEET 1.

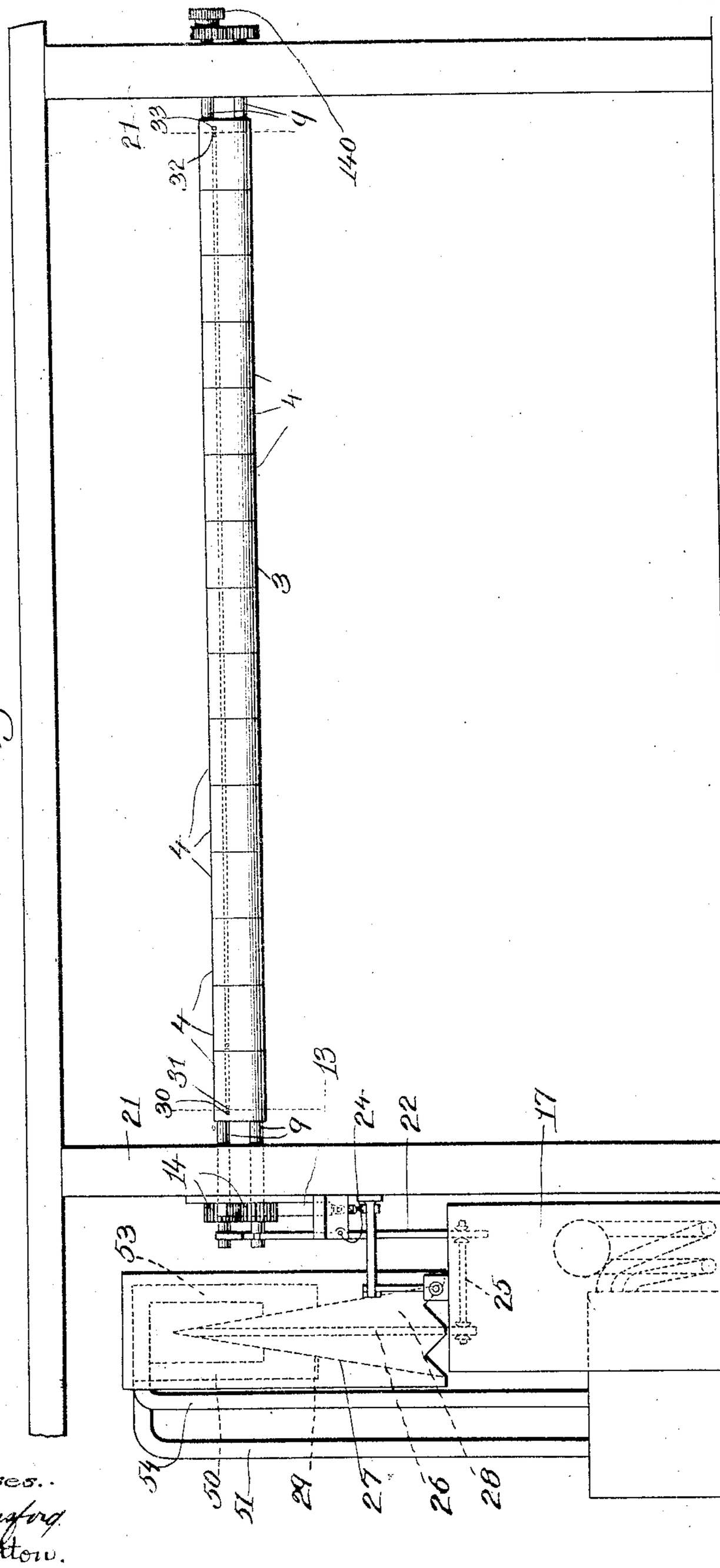

Fig. 1.

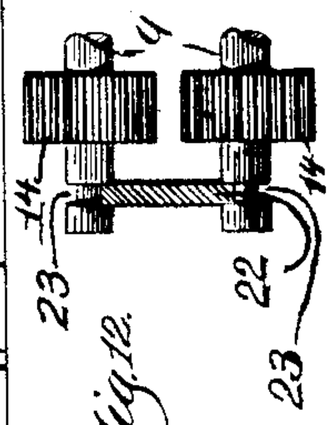

Fig. 12.

Witnesses..
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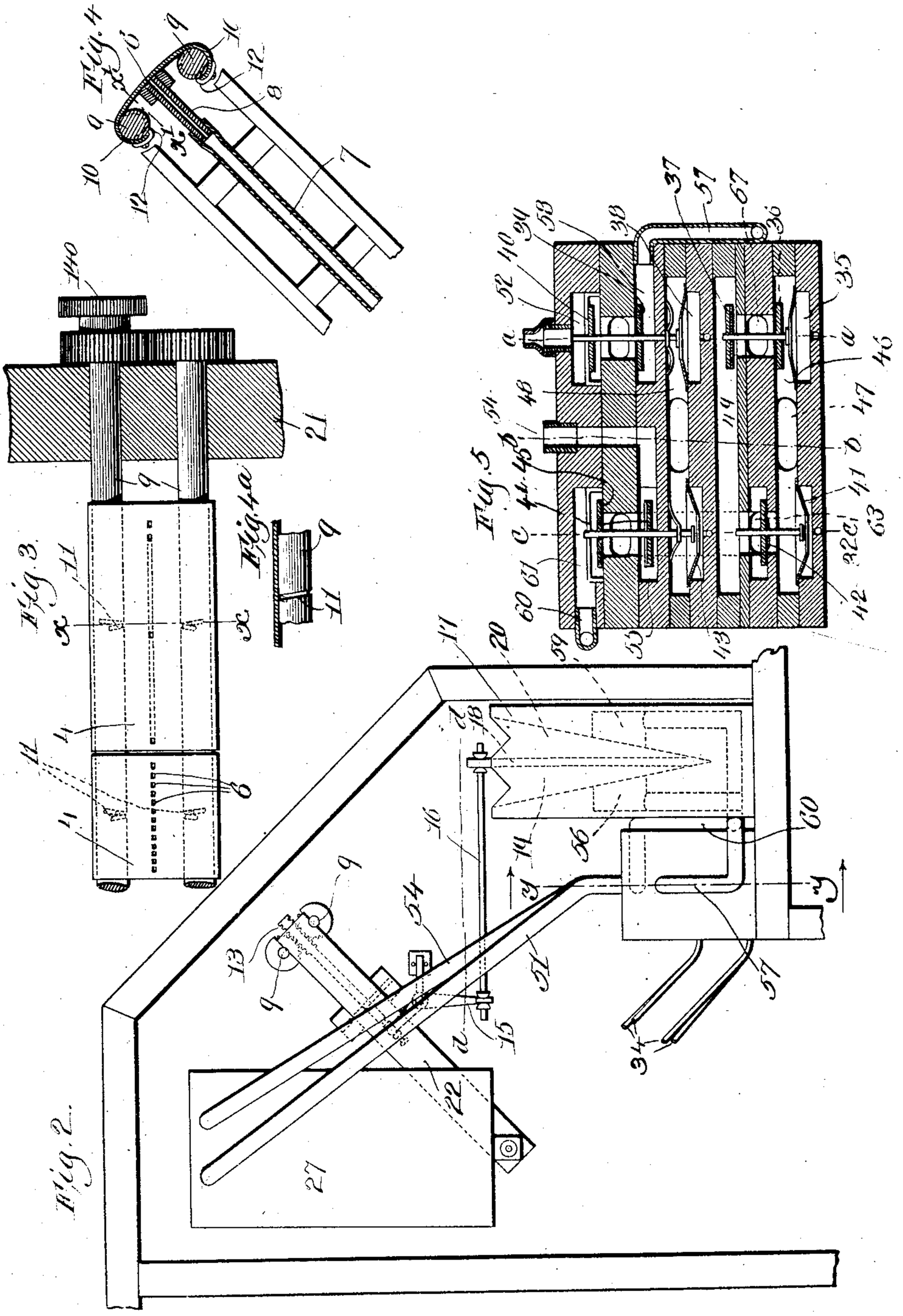
3 SHEETS—SHEET 2.



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3 SHEETS—SHEET 3.

Fig. 8.

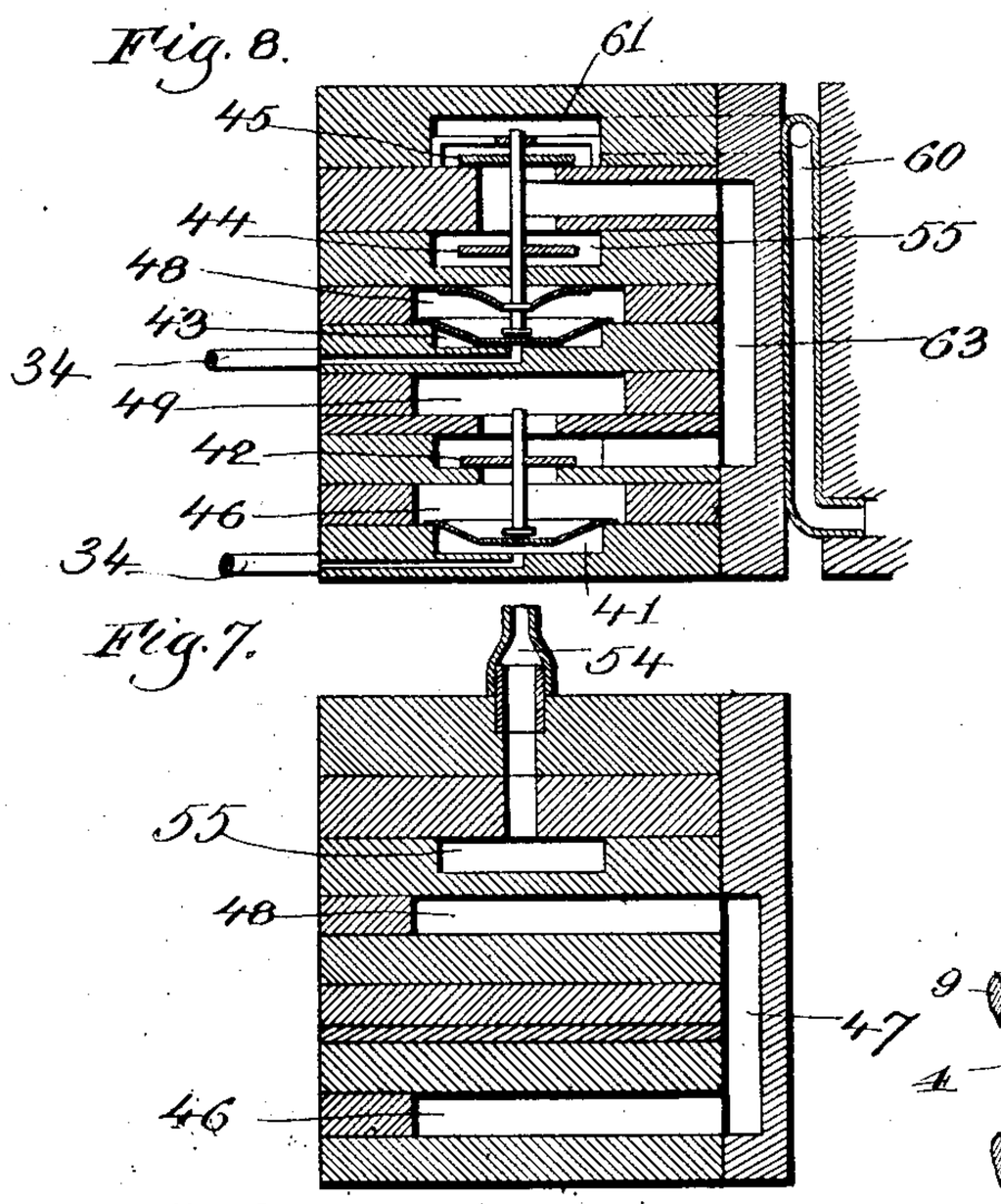
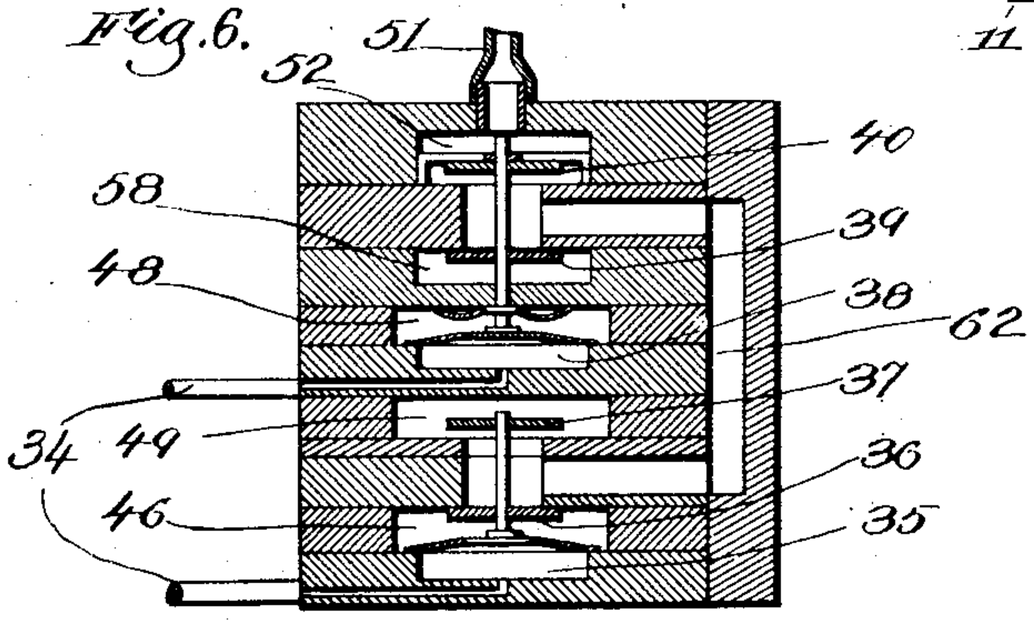


Fig. 7.

Fig. 6.



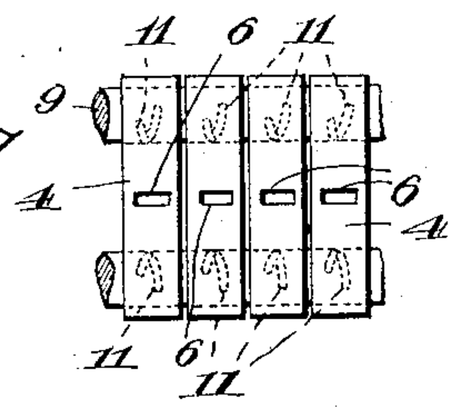
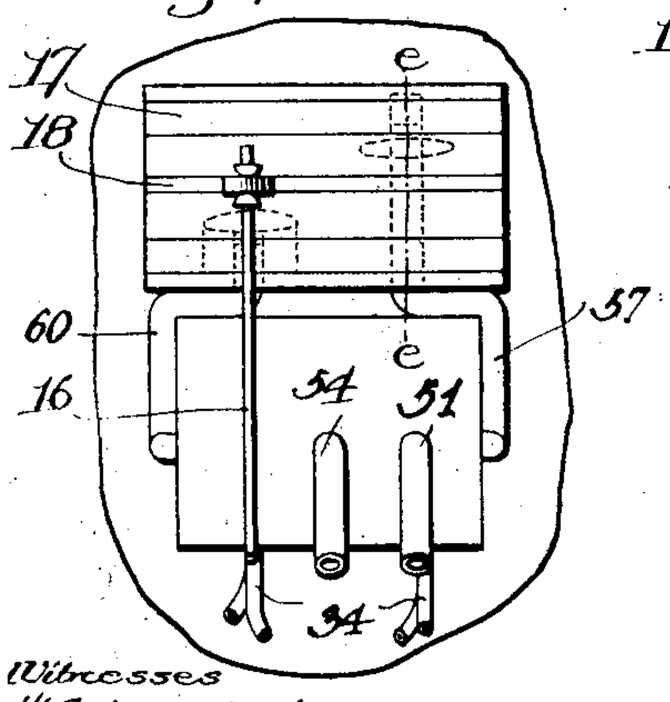


Fig. 13.

Fig. 9.



Witnesses
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S. W. Lutton

Fig. 10.

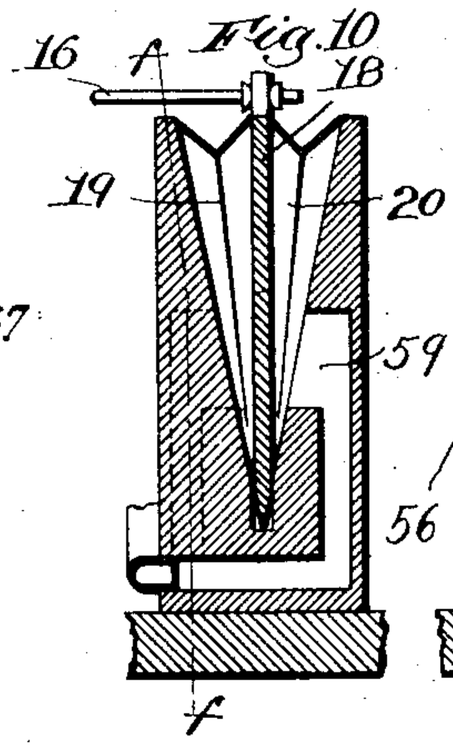
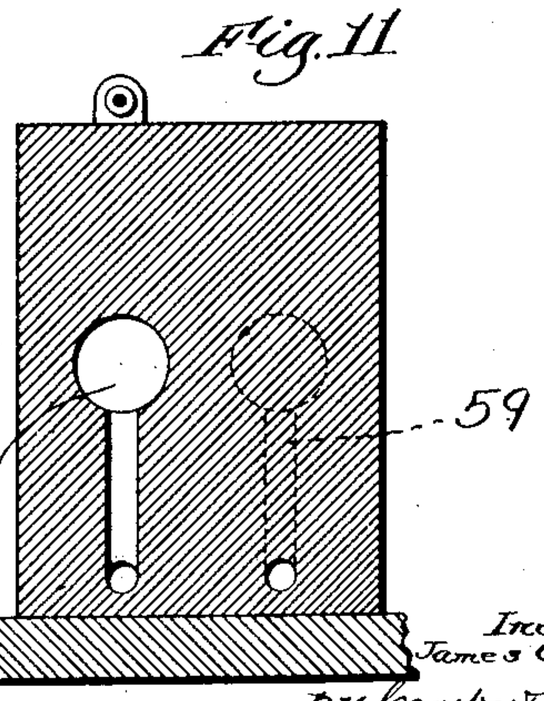


Fig. 11.



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UNITED STATES PATENT OFFICE.

JAMES C. HAGEY, OF BOSTON, MASSACHUSETTS, ASSIGNOR OF ONE-HALF TO THE CABLE COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

AUTOMATIC MUSICAL INSTRUMENT.

955,869. Specification of Letters Patent. Patented Apr. 26, 1910.

Application filed September 27, 1905. Serial No. 280,274.

To all whom it may concern:

Be it known that I, JAMES C. HAGEY, a citizen of the United States, residing at Boston, county of Suffolk, and State of Massachusetts, have invented an Improvement in Automatic Musical Instruments, of which the following description, in connection with the accompanying drawing, is a specification, like characters on the drawings representing like parts.

This invention relates to mechanisms that are operated by a perforated controlling sheet, such, for instance, as automatic musical instruments, and has special relation to the tracker-board thereof, one of the objects of the invention being to provide a novel means for expanding and contracting the tracker-board to correspond with variations in the width of the perforated sheet; another object being to provide novel means for shifting the position of the tracker-board longitudinally to bring it into proper alinement with the perforated sheet traveling thereover; another object being to provide an automatically expansible tracker-board which has uniformly spaced ducts either in its expanded or contracted position or in any intermediate position; and still another object being to provide a tracker-board such as above referred to which can be used with the ordinary perforated controlling sheet. In the preferred embodiment of my invention this control of the tracker-board both as to its length and as to its position is obtained automatically by or through the perforated sheet, the mechanism being so constructed that whenever the perforated sheet expands or contracts owing to changes in the humidity of the atmosphere, such expanding or contracting sets in motion automatically the mechanism for expanding or contracting the tracker-board to make it correspond in length with the width of the sheet, and whenever the sheet and the tracker-board get shifted laterally with respect to each other so that the perforations in the sheet do not register exactly with the ducts of the tracker-board, said mechanism is brought into action to cause a relative lateral movement between the tracker-board and the sheet, thereby to bring them into their correct position relatively to each other. The necessary expansion and contraction of the tracker-board is preferably obtained by making it in sections capable of adjustment relative to each other. Each section may have one or more ducts as desired. Where each section has one duct only the ducts throughout the length of the tracker-board are uniformly spaced because the sections are of uniform width, and one feature of my invention is providing suitable means for maintaining this uniformity of spacing of the ducts throughout the length of the tracker-board while the latter is being adjusted. This is an important feature of the invention because it obviates the necessity of specially perforating the music sheet to cooperate with the tracker-board. The sections may be adjusted either by hand or automatically, though I prefer to employ automatic means for accomplishing this, which means is controlled by the covering or uncovering by the perforated sheet of auxiliary ducts. I have shown two such ducts or apertures at each end of the tracker-board, and under normal conditions, each edge of the perforated sheet travels between the apertures in the tracker-board at the corresponding end thereof. If, however, the sheet expands in width for any reason, it will cover up the outside apertures and thereby set in motion the mechanism for expanding the tracker-board. If, on the other hand, the perforated sheet contracts in width, it will uncover the inside apertures at each end and thereby set in operation the mechanism for contracting the tracker-board. The means for shifting the tracker-board laterally is also preferably automatically controlled by the perforated sheet, and is so constructed that if the tracker-board is shifted laterally with reference to the perforated sheet so that both apertures at one end thereof are covered by the sheet and those at the other end uncovered, the mechanism for shifting the tracker-board laterally with reference to the perforated sheet to restore the two to their normal relative position is automatically set in operation.

It will be noted that the means for expanding and contracting the tracker-board, and also for shifting it laterally is controlled as to its operation by the position of the edge of the perforated sheet, and that no special perforation of the sheet for this purpose is necessary.

My improved tracker-board may be used

with any ordinary perforated controlling sheet provided of course that the ducts in the tracker-board are spaced according to the ordinary scale.

Referring now to the drawings, Figure 1 is a front view of that portion of a musical instrument containing the tracker-board, said view showing at one side diagrammatically the mechanism for adjusting, expanding and contracting the tracker-board; Fig. 2 is a side view of Fig. 1; Fig. 3 is a detailed view on an enlarged scale of one end of the tracker-board; Fig. 4 is a section on the line *x*—*x*, Fig. 3; Fig. 4ª is a section on the line *x'*—*x'*, Fig. 4; Fig. 5 is a section through the valve mechanism by which the expanding and contracting and adjusting mechanism is controlled, said section being taken on substantially the line *y*—*y*, Fig. 2; Fig. 6 is a section on the line *a*—*a*, Fig. 5; Fig. 7 is a section on the line *b*—*b*, Fig. 5; Fig. 8 is a section on the line *c*—*c*, Fig. 5; Fig. 9 is a plan view of the parts below on the line *d*—*d*, Fig. 2; Fig. 10 is a section on line *e*—*e*, Fig. 9; Fig. 11 is a section on the line *f*—*f*, Fig. 10; Fig. 12 is a detail to be referred to, and Fig. 13 is a detail showing a tracker-board embodying my invention in which each section thereof has one duct only therein.

The tracker-board is designated generally by 3, and in the embodiment of my invention herein shown, it is made in sections which can be moved relative to each other. These sections are designated by 4 and I prefer to make each section independent from the other sections and to adjust them to expand or contract the tracker-board by a suitable cam mechanism so that the uniformity of the spacing of the sections will be maintained in every adjusted position.

While a tracker-board embodying my invention may be made of any suitable material and of any desired shape, I prefer to use metal and to so construct it that it will comprise a metallic face-plate over which the perforated sheet passes, and which is provided with apertures 6 communicating with ducts 7 leading to the usual pneumatics for operating the instrument. The face-plate of the tracker-board is herein shown as having secured to the back side thereof in alinement with each aperture a metallic stem or neck 8 to which a flexible tubing, constituting the duct 7, is secured. The metallic face-plate is shown as being carried and supported by suitable rods 9.

As stated above, the tracker-board is made in sections, the sections being made by dividing the face-plate into the sections 4, each section having its edges curved, as at 10, to partially embrace the rods 9. As herein constructed, the rods 9 also constitute the cams for adjusting the various sections 4, one simple way of accomplishing this being to provide each rod adjacent each section with a cam-groove 11 into which a projection or finger 12 on the section enters, so that as the rods are turned in one direction or the other, the sections are advanced longitudinally of the rods. The sections 4 may each have one duct only therein, as shown in Fig. 13, or each may have a plurality of ducts therein. The special advantage gained by making each section with a single duct, as in Fig. 13, is that the ducts may be arranged according to the regular scale commonly used in tracker-boards for ordinary piano players, and it will be unnecessary to specially cut or perforate the controlling sheet.

In order to secure the proper alinement of the ducts in the tracker-board with the perforations in the sheet under all conditions, it is necessary to maintain the uniform spacing of the sections in all adjusted positions, for although the controlling sheet may expand or contract yet in every condition of it the perforations therein maintain their uniformity of spacing. In order to maintain this uniformity of spacing of the sections it is necessary to move or adjust those near the ends of the tracker-board to a greater extent than those adjacent the middle of the tracker-board. This is accomplished by making the different cam grooves 11 of different pitch, the cam grooves for moving the sections adjacent the neutral line of the tracker-board having a slight pitch, and those at the end having a much greater pitch; the cam grooves having a progressively increasing pitch as they approach the ends of the tracker-board. With this arrangement it will be observed that as the rods 9 are turned the uniform spacing of the sections is maintained in every adjusted position of the tracker-board. I regard this feature of my invention as of some importance, because the desired expansion and contraction of the tracker-board may be secured without resorting to the use of any specially perforated controlling sheet.

The rods 9 may be turned to extend or contract the tracker-board either manually or automatically. I have herein shown means for operating said rods in both of these ways. The two rods 9 are geared together so that they rotate in unison but oppositely. As herein shown both of said rods are operated by an actuator which can conveniently be in the form of a double rack 13 which meshes with a pinion 14 on each rod. The rods may be manually operated either by reciprocating the rack 13, or by turning one of the rods by any suitable means such as by a thumb-piece 140 on the end of one or both rods.

For automatically extending or contract-

ing the tracker-board I have provided suitable means for operating the rack-bar 13 in one direction or the other. As herein shown the rack-bar is connected to a bell-crank lever 15 which is connected by a suitable link 16 with a double power-pneumatic 17. This double pneumatic comprises a central movable partition 18 to which the link 16 is attached, said partition dividing the interior of the pneumatic into two exhaust chambers 19 and 20. These exhaust chambers are controlled by suitable valve mechanisms which will be more fully hereinafter described. With this construction it will be seen that when the exhaust-chamber 19 is exhausted the partition 18 will move to the left, Figs. 2 and 10, and thereby expand the tracker-board; while when the exhaust-chamber 20 is exhausted, said partition will move to the right, thereby contracting the tracker-board.

Before describing the valve mechanism for operating the expanding and contracting device, I will refer to the means for adjusting the tracker-board as a whole longitudinally, thereby to bring the neutral line thereof in alinement with the neutral line of the perforated sheet.

The rods 9 of the tracker-board are slidably mounted in suitable bearings 21 so that by moving said rods bodily in the direction of their length, the entire tracker-board may be adjusted transversely to the sheet. For thus moving these rods laterally, I have provided an adjusting lever 22 which is suitably pivoted at 24, and one end of which enters grooves 23 in the ends of the rods 9. Said lever is connected by a suitable link 25 to the central partition 26 of another double power-pneumatic 27, said pneumatic comprising the two exhaust-chambers 28 and 29 which are separated by the partition 26. When the chamber 29 is exhausted, the partition 26 will move to the left, Fig. 1, thereby moving the tracker-board bodily to the right, and when the chamber 28 is exhausted, the tracker-board is moved bodily to the left. In the preferred embodiment of my invention which is herein illustrated, the exhaustion of the chambers of the two double power-pneumatics is controlled by the perforated sheet, thus making the adjustment of the tracker-board entirely automatic. Moreover, this is accomplished without the necessity of having any specially perforated controlling sheet.

As herein shown I have provided each end section of the tracker-board with a pair of apertures, the apertures at one end being designated 30 and 31, and the apertures at the other end being designated 32 and 33. The ducts or conduits 34 from these apertures lead to a suitable valve mechanism, best seen in Figs. 5, 6, 7 and 8, by means of which the power-pneumatics are controlled.

While any suitable arrangement of valves for controlling the power-pneumatics may be employed without departing from my invention I prefer that shown herein.

The apertures 30, 31, 32 and 33 are so arranged that under normal conditions the edges of the perforated sheet travel between the ducts of each pair, as indicated by dotted lines in Fig. 1 so that the apertures 31 and 32 are closed by the sheet, and the apertures 30 and 33 are opened to the atmosphere. To avoid confusion, I will refer to the aperture 31 as the left-hand inside aperture, the aperture 32 as the right-hand inside aperture, the aperture 30 as the left-hand outside aperture, and the aperture 33 as the right-hand outside aperture, the terms "inside" and "outside" being used to indicate the normal position of the apertures with reference to the edge of the sheet. The duct or conduit from the right-hand outside aperture 33 leads to a pneumatic chamber 35, the diaphragm of which has connected thereto two valves 36 and 37. The duct communicating with the left-hand outside aperture 30 leads to a pneumatic chamber 38, the diaphragm of which is connected to two valves 39 and 40. The duct communicating with the right-hand inside aperture 32 leads to a pneumatic chamber 41, the diaphragm of which connects by a suitable valve-stem with a valve 42, and the duct leading from the left-hand inside aperture 31 communicates with a pneumatic chamber 43, the diaphragm of which is connected by a suitable valve-stem with two valves 44 and 45. The space 46 above the diaphragms of the pneumatic chambers 35 and 41 is connected to a suitable suction apparatus, and is also connected by a suitable duct 47 with the space 48 above the diaphragms of the pneumatic chambers 38 and 43. The space 49 communicates with the atmosphere.

The exhaust-chamber 29 of the power-pneumatic 27 communicates by means of a port 50 and a conduit 51 with the space 52 above the valve 40, and the exhaust-chamber 28 of said power-pneumatic communicates by a suitable port 53 and a conduit 54 with the valve-chamber 55 in which the valve 44 plays. The exhaust-chamber 19 of the power-pneumatic 17 communicates by means of a suitable port 56 and a conduit 57 with the valve chamber 58 in which the valve 39 plays, and the exhaust-chamber 20 of said power-pneumatic 17 communicates by a port 59 and a conduit 60 with the valve-chamber 61 in which the valve 45 plays.

62 designates a duct connecting the space between the two valves 36 and 37 to that between the valves 39 and 40; and 63 is another duct connecting the valve-chamber in which the valve 42 operates to the space between the valves 44 and 45.

The valves and pneumatics are shown in Fig. 5 in the positions they normally occupy when the perforated sheet is correctly placed on the tracker-board, the inside apertures 31 and 32 being covered and consequently the pneumatics 41 and 43 being exhausted, it being understood that the diaphragms of these pneumatics each have the usual bleed-hole so that when the apertures 31 and 32 are covered, the said pneumatics become exhausted.

In order to trace out the operation of this mechanism, let us assume in the first place that the perforated sheet has expanded in width sufficiently to cover the outside apertures 30 and 33. When this occurs, communication between the pneumatic chambers 35 and 38 and the atmosphere is cut off, and as the diaphragms in these pneumatics are provided with the usual bleed-holes, said chambers become exhausted and the diaphragms collapse. When this occurs, the valve 37 closes and the valve 36 opens, and at the same time valve 39 opens and valve 40 closes. The conduit 57 is thereby thrown into communication with the port 62 and the latter with the exhaust-chamber 46 with the result that the chamber 19 of the power-pneumatic 17 begins to be exhausted and the partition 18 will move toward the left in Fig. 2; thus shifting the rack-bar 13 and turning the rods or supports 9 to expand the tracker-board. As soon as the tracker-board has been sufficiently expanded so that the outside apertures 30 and 33 are carried beyond the edge of the sheet, air is admitted to the pneumatic chambers 35 and 38 and the pneumatics thereof are inflated, thus restoring the valves 36, 37 and 39, 40 to the position shown in Fig. 5 and connecting the chamber 19 with the atmosphere. As soon as this occurs, the pressure on the partition 18 is balanced, there being atmospheric pressure in both chambers 19 and 20, and the said partition, therefore, will remain in the position in which it has been carried by the partial exhaustion of the chamber 19 until another adjustment of the tracker-board is needed. If, on the other hand, the sheet contracts in width so as to uncover the inside apertures, air will be admitted to the pneumatic chambers 41 and 43, thereby expanding said pneumatic chambers and lifting the valve 42 to open communication between the port 63 and the exhaust-chamber 46, and also closing the valve 44 and opening the valve 45. When this occurs, the conduit 60 is connected directly with the exhaust-chamber 46 and the chamber 20 of the power-pneumatic 17 is partially exhausted thereby shifting the partition 18 to the right, Fig. 2. The movement of said partition in this direction operates through the connections above described to contract the tracker-board and thus to withdraw the inside apertures under the controlling sheet. As soon as the said inside apertures are covered, the valves 42, 44 and 45 resume the position shown in Fig. 5, thus admitting atmospheric pressure to the chamber 20, placing the partition 18 in equilibrium again where it will remain until further adjustment of the tracker-board is needed. If the tracker-board is, for any reason, shifted to the left sufficiently so that the controlling sheet covers the right-hand outside aperture 33, the left-hand outside aperture 30 remaining uncovered, the pneumatic chamber 35 will become exhausted and the exhaust-chamber 46 will be connected through the port or duct 62 with a conduit 51 leading to the chamber 29 of the power-pneumatic 27. The partition 26 will then have less pressure on one side than on the other and said partition will move to the left, Fig. 1, thereby shifting the tracker-board bodily to the right until the right-hand aperture 33 is uncovered again. As soon as said right-hand aperture is uncovered, the partition 26 is again placed in equilibrium and it will remain in the position in which it has been moved by the partial exhaustion of the chamber 29 until the tracker-board needs further adjusting. If, on the other hand, the tracker-board should be shifted to the right with reference to the controlling sheet sufficiently so that the inside right-hand aperture 32 were uncovered, then the pneumatic 41 would be expanded and the conduit 54 leading to the chamber 28 of the power-pneumatic would be connected with the exhaust chamber 46, thus again placing an uneven pressure on the two sides of the partition 26 and causing the latter to move to the right, Fig. 1. This movement of the partition moves the tracker-board bodily to the left to restore it to the normal position and as soon as this occurs, the partition 26 is again placed in equilibrium.

The arrangement of the pneumatics above described, is such that the tracker-board may always be brought back into its correct position either by expanding or contracting it or moving it bodily and it will be kept in such position and condition without any hand manipulation.

It will be obvious that the rods 9 and consequently the tracker-board may be shifted laterally by hand. My invention is not limited to the use of automatic device to adjust the length of the tracker-board or to such a device to shift it laterally of the perforated sheet, but I prefer to employ such automatic means. When the automatic means are employed, it is of advantage to have the tracker-board arranged for manual adjustment also so that in case the automatic means fails to act for any reason, the proper adjustment can be made manually.

It is also of advantage to be able to manually adjust the tracker-board before operating the instrument.

I believe that I am the first to provide an expansible and contractible tracker-board in which the ducts are uniformly spaced in every adjusted position of the tracker-board with means for automatically securing the expansion or contraction of the tracker-board. I am aware that this expansion may be obtained by various methods through the use of different mechanical movements, and I do not desire to limit myself to the particular mechanism shown for obtaining this proportionate individual adjustment of the sections of the tracker-board.

While the invention has been especially designed for use in connection with musical instruments, yet it may be embodied in any machine in which perforated sheets traveling over a tracker-board are employed for controlling or operating certain mechanisms.

Having fully described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. In a device of the class described, a transversely-divided tracker-board having a plurality of independent sections on each side of the center thereof and means to adjust all sections of the tracker-board relative to each other simultaneously and to give the outside or end sections a greater movement than the central sections.

2. In a device of the class described, a transversely-divided tracker-board having a plurality of independent sections on each side of the center thereof, a perforated controlling sheet passing across said tracker-board and means controlled by said sheet to adjust all the sections relative to each other simultaneously, said means operating to give the outside or end sections a greater adjustment than the central sections.

3. In a device of the class described, a transversely-divided tracker-board having a plurality of independent sections on each side of the center thereof, a perforated controlling sheet arranged to pass across said tracker-board and automatic means controlled by said sheet to adjust said sections relative to each other, said means operating to move the sections a greater or less extent dependent upon the distance thereof from the center of the tracker-board.

4. In a device of the class described, a tracker-board composed of a plurality of separate sections, a rotary shaft extending longitudinally of the tracker-board, connections between said shaft and each section, said connections being such that rotation of the shaft moves certain of the sections in one direction and others of the sections in the opposite direction, a controlling sheet for said tracker-board and automatic means rendered operative by expansion or contraction of said controlling sheet to rotate said shaft in one direction or the other.

5. In a device of the class described, a tracker-board composed of a plurality of separate sections, a rotary shaft extending longitudinally of the tracker-board, connections between said shaft and each section, said connections being such that rotation of the shaft moves certain of the sections in one direction and others of the sections in the opposite direction, a controlling sheet for said tracker-board and automatic means rendered operative by expansion or contraction of said controlling sheet but not affected by bodily lateral movement thereof to rotate said shaft in one direction or the other.

6. In a device of the class described, a tracker-board formed of a plurality of sections each having a projecting finger, a shaft having a cam-groove for each finger and means to rotate the shaft.

7. In a device of the class described, a tracker-board formed of a plurality of separate sections and a cam device to act on each section to move the same longitudinally of the tracker-board.

8. In a device operable by a perforated controlling sheet of expansible and contractible material, a tracker-board formed of a plurality of independent sections, cam-mechanism to move the sections longitudinally of the tracker-board thereby to expand or contract the length of the tracker-board and automatic means to actuate said cam-mechanism as the paper expands or contracts.

9. A tracker-board comprising two supporting rods and a perforated metallic face-plate supported by the rods, the edges of the face-plate embracing the rods.

10. A tracker-board comprising a sectional metallic face-plate provided with apertures, a pair of rods on which said face-plate is supported, the edges of the sections of the face-plate embracing the rods, and nipples secured to the back side of the face-plate in alinement with the apertures therein.

11. In a device of the class described, a perforated sheet, a tracker-board provided with an aperture normally situated outside of each edge of said sheet as it travels over said tracker-board, a single tracker-board-expanding device and means to operate said tracker-board-expanding device to expand the tracker-board by the covering of both of said apertures due to the expansion of the sheet.

12. A perforated sheet, a tracker-board provided with apertures which are normally covered by the opposite edges of said sheet as it travels over the tracker-board, a single tracker-board-contracting device and means

to operate said tracker-board-contracting device thereby to contract the tracker-board by the uncovering of said apertures due to the shrinking of the sheet.

13. In a device of the class described, a perforated sheet, an expansible and contractible tracker-board having at each end a pair of apertures, one aperture of each pair being normally covered by the sheet as it travels over said tracker-board and the other aperture of each pair being normally uncovered, and means set in operation by the covering or uncovering of said apertures due to the swelling or shrinking of the sheet to expand or contract said tracker-board.

14. In a device of the class described, a perforated sheet, a tracker-board having at each end a pair of apertures, one aperture of each pair being normally uncovered and the other being normally covered by the perforated sheet as it travels over the tracker-board, and means set in operation by impulses obtained by uncovering one of the normally-covered apertures and covering one of the normally-uncovered apertures to give a relative lateral movement between the tracker-board and the perforated sheet.

15. In a device of the class described, a perforated sheet, an expansible and contractible tracker-board having at each end a pair of apertures, one aperture of each pair being normally uncovered and the other being normally covered by the perforated sheet as it travels over the tracker-board, and means set in operation by impulses obtained by uncovering the normally-covered apertures and covering the normally-uncovered apertures to move the tracker-board laterally of the perforated sheet and to expand and contract said tracker-board.

16. In an apparatus operable by a perforated controlling sheet, a perforated controlling sheet, an expansible and contractible tracker-board and means controlled by said sheet to expand or contract the tracker-board and also to shift the tracker-board in the direction of its length.

17. In a device of the class described, an expansible and contractible tracker-board, a perforated controlling sheet therefor, a single pneumatically operated device to expand or contract said tracker-board and means to render said device operative by relative changes in the position of opposite edges of the sheet.

18. In a device of the class described, an expansible and contractible tracker-board having ducts, movable supports therefor and means to effect a change in length of the tracker-board by movement of the supports.

19. In a device of the class described, a tracker-board divided into individual sections, supports for the sections of the tracker-board and means to effect an individual adjustment of said sections relative to each other by a movement of said supports.

20. A tracker-board divided transversely into sections, rods or shafts on which said sections are supported and means to adjust positively said sections individually relative to each other by said rods or shafts.

21. In a device of the class described, a perforated controlling sheet, a tracker-board having at each end a pair of apertures, one aperture of each pair being normally uncovered and the other being normally covered by the perforated sheet as it travels over the tracker-board, and means set in operation by the covering of one of said apertures only to shift the tracker-board longitudinally sufficiently to uncover said aperture.

22. In a device of the class described, a perforated controlling sheet, a tracker-board having at each end a pair of apertures, one aperture of each pair being normally uncovered and the other being normally covered by the perforated sheet as it travels over the tracker-board, and means set in operation by the uncovering of one only of the covered apertures to move the tracker-board longitudinally.

23. In a device of the class described, a perforated controlling sheet, a tracker-board having at each end a pair of apertures, one aperture of each pair being normally uncovered and the other being normally covered by the perforated sheet as it travels over the tracker-board, and means set in operation by the covering of one only of said uncovered apertures or by the uncovering of one only of the covered apertures to shift the tracker-board longitudinally.

24. The combination, with a tracker-board divided transversely into sections, of means for adjusting said sections relatively to each other and means for bodily shifting the tracker-board.

25. A tracker-board provided with apertures and composed of a plurality of sections, a controlling sheet provided with rows of perforations arranged for registration with said apertures and means controlled by said sheet for adjusting said sections relatively to each other, in combination with means for bodily shifting the tracker-board laterally of said sheet.

26. The combination, with a tracker-board, of means to effect longitudinal expansion and contraction thereof and means to impart a longitudinal bodily movement thereto.

27. In a device of the class described, an expansible and contractible tracker-board, a perforated controlling sheet therefor and means rendered operative by expansion or contraction of the controlling sheet for expanding or contracting the tracker-board but not affected by bodily lateral movement of said controlling sheet.

28. In a device of the class described, an expansible and contractible tracker-board, a perforated controlling sheet therefor, and means rendered operative by bodily lateral movement of the controlling sheet to impart a longitudinal bodily movement to the tracker-board irrespective of any expansion or contraction in the controlling sheet.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

JAMES C. HAGEY.

Witnesses:
LOUIS C. SMITH,
RICHD. W. GORTZ.