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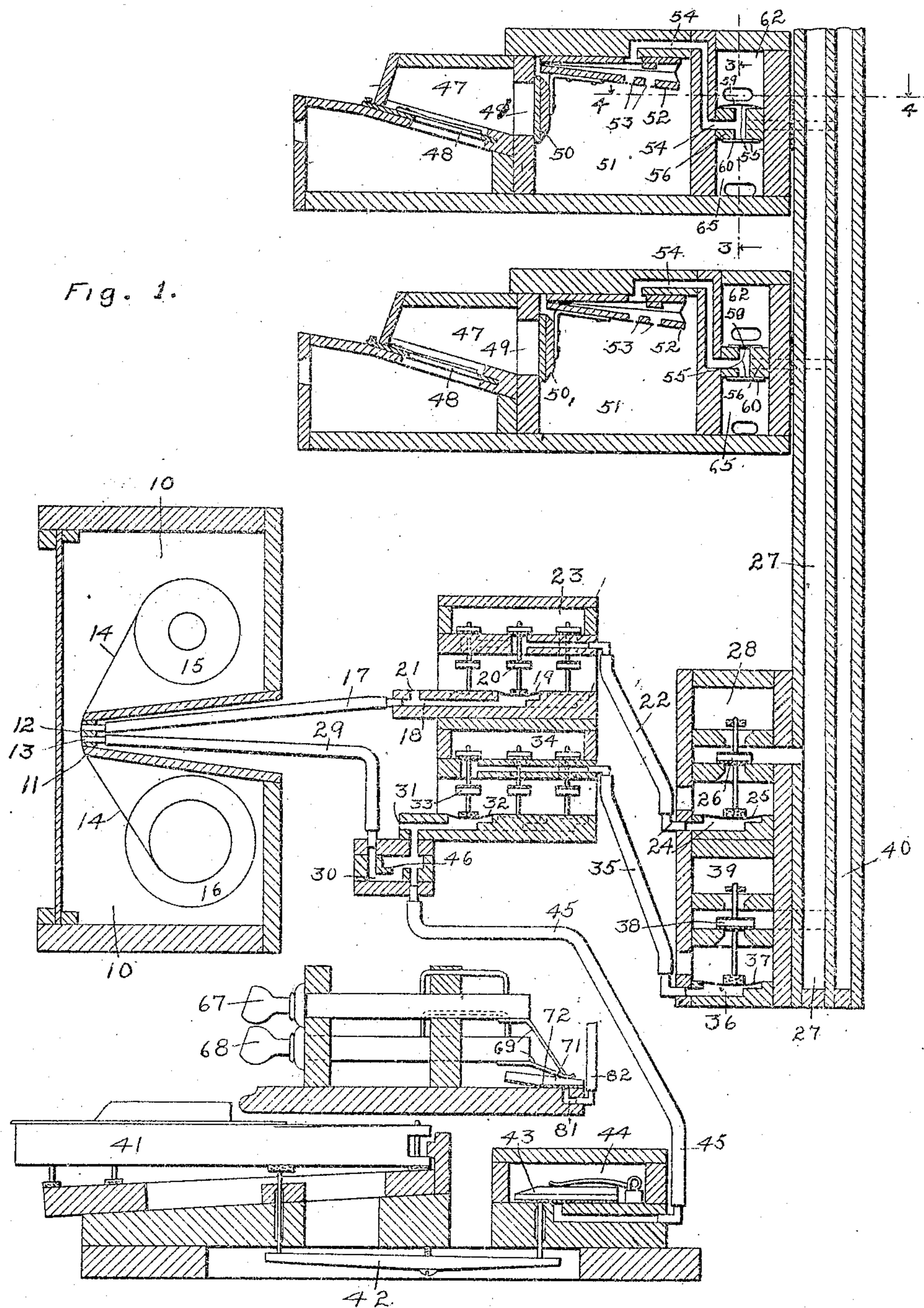
PATENTED JUNE 23, 1908.

G. B. KELLY.

MECHANICAL MUSICAL INSTRUMENT.

APPLICATION FILED JUNE 25, 1906.

3 SHEETS—SHEET 1.



**WITNESSES:**

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No. 891,550.

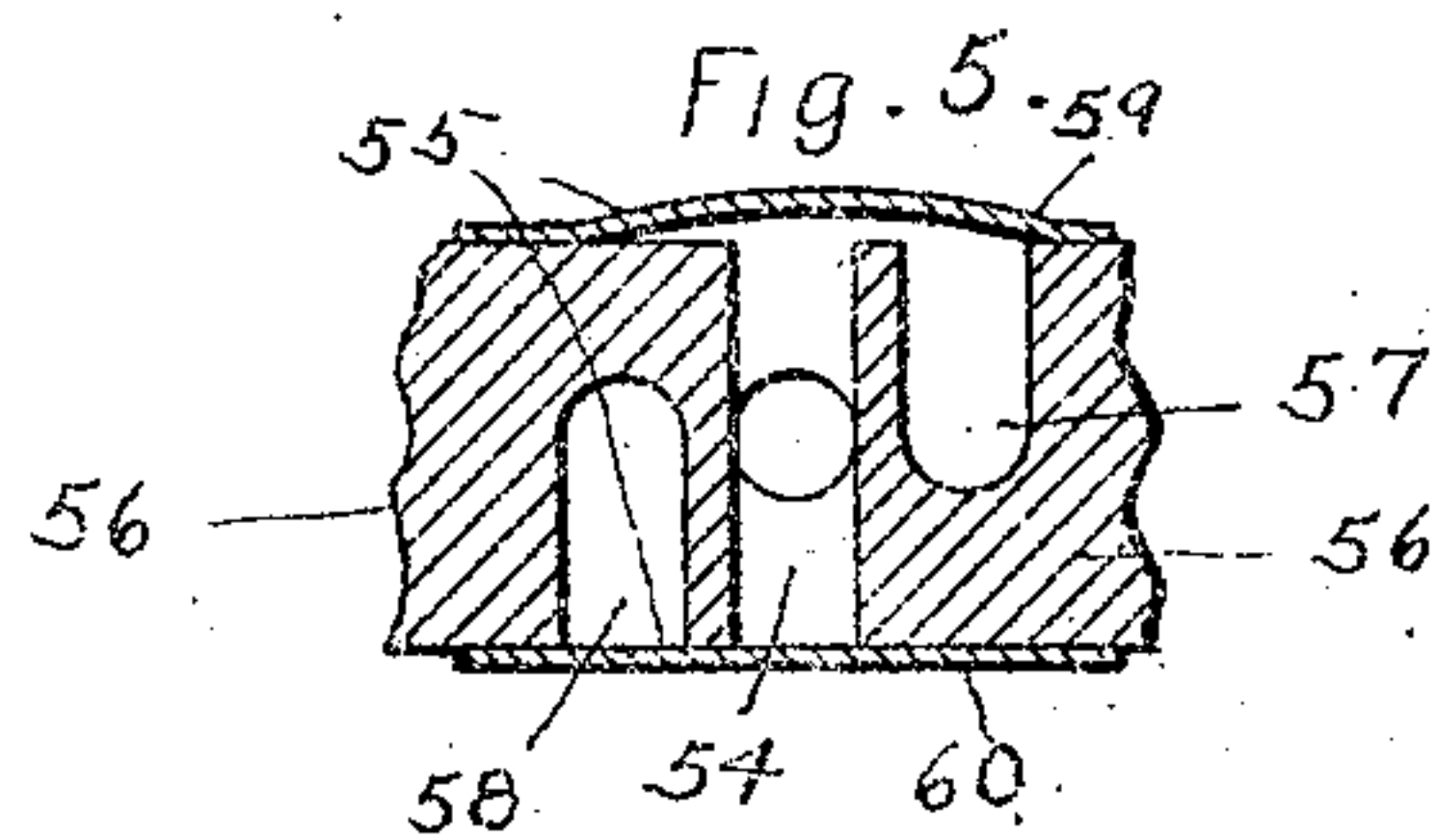
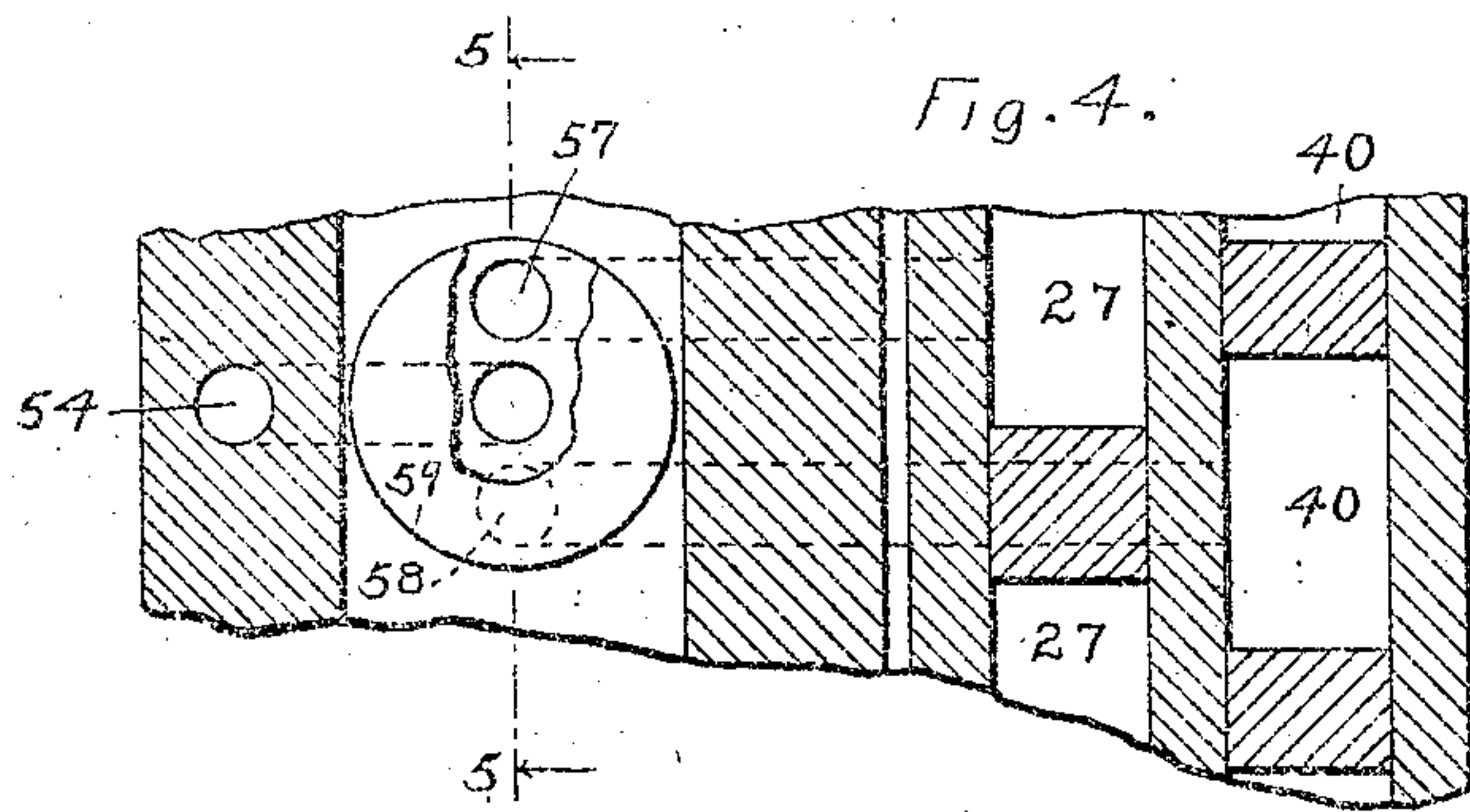
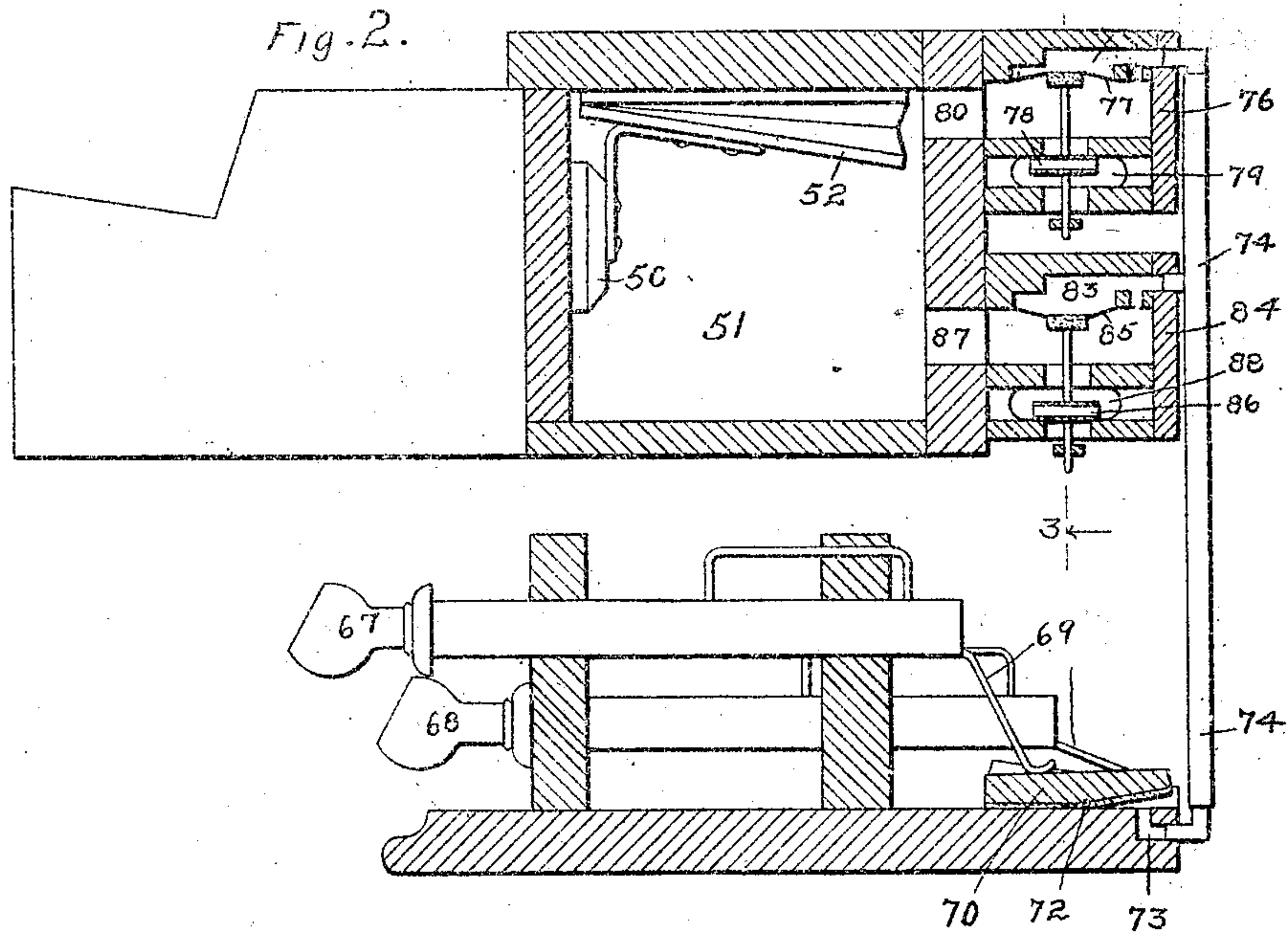
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3 SHEETS—SHEET 2.



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3 SHEETS—SHEET 3.

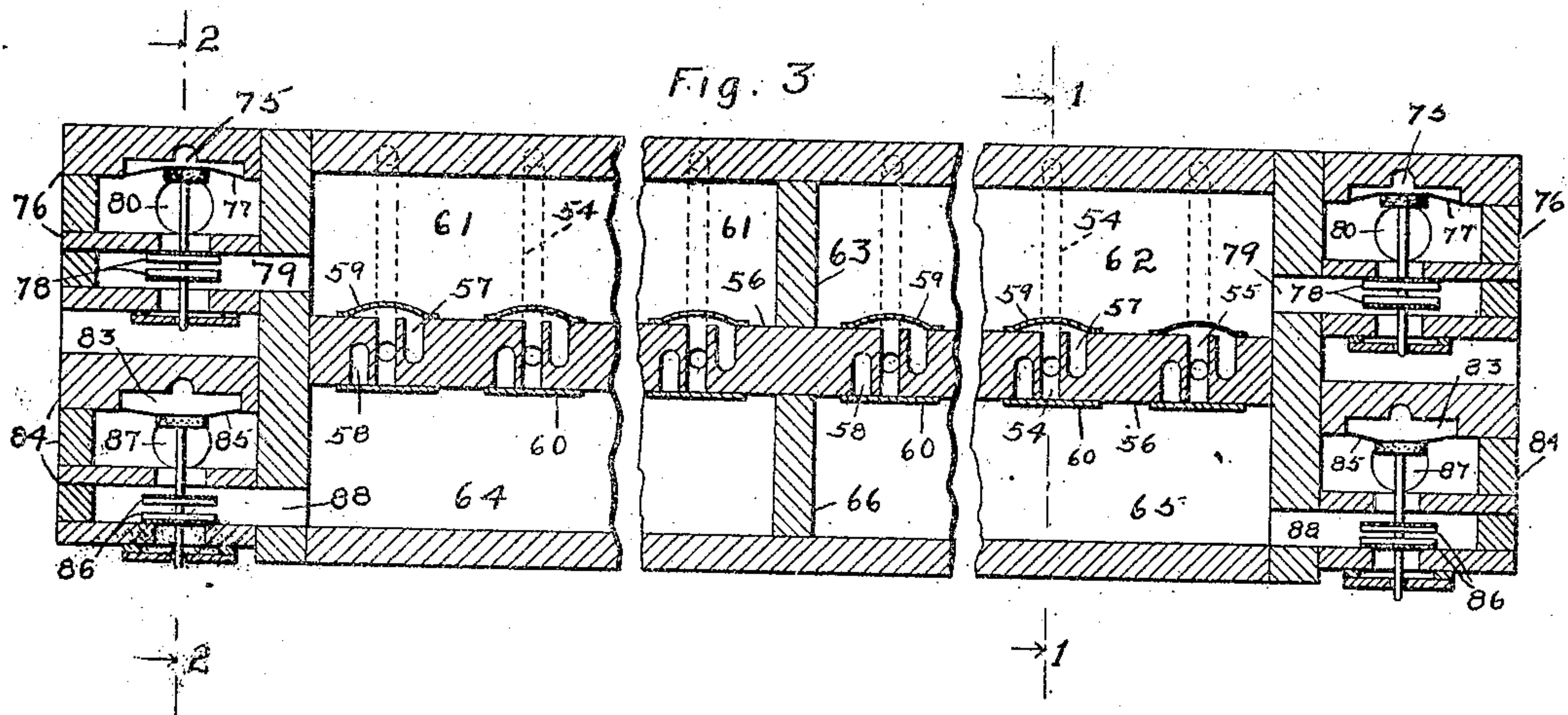
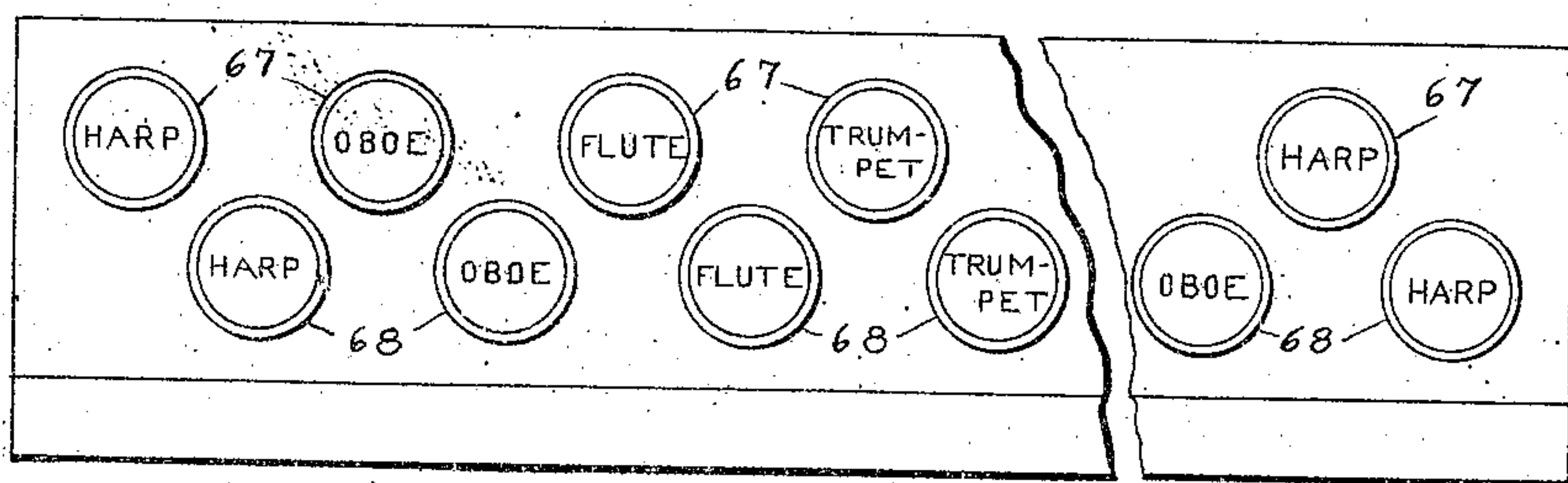


Fig. 6.



WITNESSES:

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# UNITED STATES PATENT OFFICE.

GEORGE B. KELLY, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO THE AEOLIAN COMPANY, OF NEW YORK, N. Y., A CORPORATION OF CONNECTICUT.

## MECHANICAL MUSICAL INSTRUMENT.

No. 891,550.

Specification of Letters Patent.

Patented June 23, 1908.

Application filed June 25, 1906. Serial No. 323,286.

*To all whom it may concern:*

Be it known that I, GEORGE B. KELLY, a citizen of the United States, and a resident of Boston, county of Suffolk, and State of Massachusetts, have invented certain new and useful Improvements in Mechanical Musical Instruments, of which the following is a specification.

My invention relates to mechanical musical instruments such as are controlled by the passage of a music sheet over a tracker.

It particularly refers to instruments provided with a double tracker board, that is, a tracker board having two independent sets of ducts therein. Its object is to enable such instruments, in connection with a perforated music sheet adapted thereto, to play any desired set of reeds or sounding devices from either set of ducts in the tracker board at will.

A further object of the invention is to enable the operator by means of manual stops to control this playing of the sets of note sounding devices of various characters so as to play some from one and others from the other set of ducts at will.

Further objects of the invention will appear in the specification.

The drawings show the device as applied to a reed organ mechanism actuated by superatmospheric pressure.

In the drawings, Figure 1 is a transverse vertical section of so much of a mechanical musical instrument as is necessary to illustrate my invention, a portion of the drawing being on the plane 1—1 of Fig. 3. Fig. 2 is a partial transverse vertical section of the instrument, part of which is taken through the plane 2—2 of Fig. 3. Fig. 3 is a longitudinal vertical section of a portion of the instrument through the plane 3—3 of Fig. 1. Fig. 4 is a longitudinal horizontal section of a portion of the instrument through the plane 4—4 of Fig. 1. Fig. 5 in vertical section shows a detail. Fig. 6 is a partial front elevation of the instrument.

In the drawings, 10 designates a pressure chamber, into which extends a tracker 11 having two sets of ducts 12 and 13. Over the tracker 11 is moved the perforated music sheet 14 mounted on a music roll 15 and adapted to wind on a take-up roll 16. As means of moving the music sheet are well

known and form no part of the present invention it is not necessary that they be further illustrated or described. I have shown the two sets of ducts 12 and 13 in the present instance as arranged one above the other, in staggered relation, in the tracker board 11, but it is obvious that they may be arranged in a single line alternating with each other, if desired, in which case the width of the music roll 14 would necessarily be slightly increased. Leading from each of the ducts 12 is a flexible tube 17 connecting to a passage 18, at the end of which is mounted a diaphragm 19 of a double valve 20. The passage 18 is provided with a suitable bleed hole 21.

The double valve 20 is adapted to alternately admit to the connection 22 atmospheric air or air under pressure from a chamber 23. It is of course understood that the chambers 10 and 23, as well as several other pressure chambers hereafter to be described, are connected to a source of pneumatic pressure, not shown. The tube 22 connects with a passage 24, which is closed by the diaphragm 25 of a double diaphragm valve 26, which acts to pneumatically connect the passage 27 with atmospheric air or with air under pressure from a chamber 28. In like manner each of the lower set of ducts 13 is connected by a tube 29 to a passage 30 having a bleed hole 31 and closed by a diaphragm 32 connected with a double valve 33, which passes atmospheric air or air under pressure from a chamber 34 to a tube 35, which in turn connects with a passage 36 under a diaphragm 37 operating a double valve 38, which alternatively admits atmospheric air or air under pressure from a chamber 39 to a passage 40.

For manually playing the instrument it is provided with a set of keys 41, each of which operates through a lever 42 to raise a valve 43 in a pressure chamber 44, whereby air under pressure is permitted to pass through a tube 45 to the passage 30 before described. The passage 30 is provided with a flap valve 46, the function of which will hereafter appear.

Mounted, in the present instance, above the parts already described are stops or sets of reed cells 47, in each of which is a reed 48. Of these stops only two for example harp and oboe are shown in Fig. 1 of the drawings,



but it is obvious that there may be any desired number in the instrument, as indicated in Fig. 6. Each reed cell 47 is connected by a passage 49 closed by a valve 50 to a pressure chamber 51, which extends for a considerable portion of the length of the instrument so that it is common to an entire set of reeds 48. Each valve 50 is connected with an operating pneumatic 52 provided with the usual bleed hole 53. The pneumatic 52 connects by means of a passage 54 with a pair of diaphragm valves 59, 60, the ducts and seats of a set of which valves are formed in a board 56 which constitutes a horizontal partition extending longitudinally of the instrument. The diaphragm 59 and 60 have at each side of the passage 54 a port marked 57 and 58 respectively, one leading upward and the other downward to the respective faces of the board 56. Each port 57 connects with one of the passages 27 and each port 58 with one of the passages 40, already described. The passage 54 is opened or closed to the ports 57 and 58 by means of diaphragms 59 and 60 respectively secured to the upper and lower sides of the board 56. Above the board 56 are two wind chests or chambers 61 and 62 respectively, separated by a vertical partition 63 placed so as to divide the treble from the bass end of the instrument. In like manner below the board 56 are wind chests or chambers 64 and 65 separated by a partition 66.

Arranged, in the present instance, above the manual keys 41 of the instrument are stop manuals, preferably superposed in pairs, one pair of these stops being indicated at 67, 68 respectively, (see Figs. 1 and 2 of the drawings). It is of course understood that there is a pair of these manuals at the treble end of the instrument and a similar pair at the bass end for each stop or set of reeds, as harp, oboe, flute, trumpet, etc., (see Fig. 6). Each of the stops is provided at its rear end with a finger 69 adapted to rock block valves 70, 71 respectively, mounted on pivots 72. These valves are alike and in Fig. 1 the section is distorted slightly to show the valve 71 controlled by stops 68, omitting the valve 70 controlled by the stop 67 because that is accurately shown in Fig. 2. The valve 70 controlled by the manual stop 67 acts to admit air to a port 73, which is connected by a tube 74 to a recess 75 in a valve box 76, (see Figs. 2 and 3). The recess 75 is closed by a diaphragm 77 connected to a double diaphragm valve 78 operative to alternatively admit atmospheric air or air under pressure from the chamber 51 through a passage 79 to the chamber 61, it being understood that the box 76 communicates with the chamber 51 through a port 80. In like manner the manual stop 68 operates to rock the valve 71 and thereby admit air to a port 81, which is connected by a tube 82 to a recess

83 in a valve box 84, the recess 83 being closed by the diaphragm 85 connected to a double diaphragm valve 86 operative to admit air from the chamber 51 through passages 87 and 88 to the chamber 64.

It will be understood that, in the form of my device herein illustrated, the draw stops or manual stops 67 and 68 and all the parts above described as connected therewith are duplicated at the other end of the instrument, as clearly shown in Fig. 3 of the drawings, so that one pair of stops 67, 68 is connected with the treble end of the instrument and the other with the bass end. It will be also understood that the numbers of pairs of these stops at each end of the instrument corresponds with the number of reed chests 51, several of the stops being shown in Fig. 6 of the drawings.

I will first describe the operation of the device as effected by the movement of the perforated music roll 14 over the tracker ducts 12 and 13. It is of course understood that the music roll is perforated for an instrument of this particular type, so that, *e.g.*, the solo portion of the composition is adapted to pass over the tracker ducts 12, while the accompaniment portion thereof passes over and registers with the tracker ducts 13. It is evident that when a perforation in the music sheet passes over one of the ducts 12 pneumatic pressure from the chamber 10 will be exerted through the tube 17 and passage 18 to lift the diaphragm 19, by which the valve 20 will be closed to atmospheric air and opened to the pressure chamber 23, from which pneumatic pressure will pass through the tube 22 and passage 24 to raise the diaphragm 25, by which the double valve 26 is closed to the pressure chamber 28 and opened to atmosphere. This permits the exhaustion of pressure from the passages 27 and 57, the latter being in the valve 55. As, however, air pressure exists in all the chambers 61, 62, 64 and 65, it is evident that all the diaphragms 59 and 60 will be held close to their seats so that no communication is possible between the passage 57 and the passage 54. If, however, one of the draw stops 67 located at the treble end of the instrument had previously been drawn out, (see Figs. 2 and 3) the pressure in the corresponding chamber 61 would have been exhausted by reason of the movement of the valve 78 caused by exhaustion of pressure on the upper side of the diaphragm 77 through the passage 75, tube 74 and port 73. In this case the pneumatic pressure in the tube 57 would suffice to raise the diaphragm 59, thereby opening communication between the passage 57 and the passage 54, which leads to the particular pneumatic 53 connected with the particular tracker duct uncovered. Air being exhausted from the pneumatic 52 the pressure in the chamber 51 acts to collapse



the pneumatic and to open the valve 50, whereby, in the present instance, the reed 48 is caused to speak. It is obvious that by opening the appropriate treble manual stop 5 67, any treble set or stop of reeds may be made ready for actuation by perforations in the tracker duct, as described. It is obvious that in the same way a perforation in the sheet 14 passing over one of the ducts 13 of 10 the lower series will act through the tube 29 and passage 30 to raise the valve 33, which in turn acts to raise the valve 38, thereby permitting exhaustion of air from the passage 40 which connects with the passage 58 in the valve 15 55. To cause a note of the treble set of any particular stop of reeds to be thus sounded, it is necessary to draw out the appropriate lower manual 68, which permits the movement of such of the lower diaphragms 60 in 20 the wind chest 64 as are pressed downwardly by the pneumatic force admitted thereto through the particular passage 40 connected, as already described, with the particular duct 13 in the tracker. It is obvious that the bass 25 end of the scale in each of the sets or stops of reeds is similarly operated by the corresponding stop manuals at the left of the instrument. It will be noted that all these stop manuals are conveniently located above 30 the keyboard of the instrument so as to be easily manipulated by the operator. In the present instance I have shown a single set of manual keys 41 for playing the instrument. When the instrument, as herein shown, is to 35 be manually played, it is necessary that the tracker ducts 12 be closed, which may be done by leaving an imperforate portion of the music sheet thereover, or in any other well known or desired manner. The depression 40 of any key 41 will act through the lever 42 to raise the lever 43 and admit pneumatic pressure from the chamber 44 through the tube 45 to the passage 30. The effect of this pressure will be to close the flap valve 46 and at 45 the same time to raise the diaphragm 32, thereby moving the valve 33, the effect being precisely as already explained in connection with the movement of a perforation in the music sheet over the duct 13 corresponding 50 to the key manually depressed. It will thus be seen that the instrument may be operated manually instead of by the perforated music sheet, if desired.

It is obvious that many mechanical changes 55 may be made in my device without departing from my invention.

What I claim is:—

1. Musical apparatus having a plurality of 60 sets of note sounding devices of different characters, two sets of tracker ducts and pneumatic connections for operating the sounding devices from each set of ducts, a double set of draw stops, one pair for each set of note sounding devices, and a plurality 65 of means, one for each stop, controlled there-

by for preventing or permitting the operation of the respective sounding devices from the respective sets of tracker ducts.

2. In a mechanical musical instrument, a plurality of sets of tracker ducts, a set or 70 stop of note sounding devices, an independent connection from a tracker duct of each set to the respective note sounding device, and a plurality of manually controlled means for cutting out portions of each set of said 75 tracker duct connections at will.

3. In a mechanical musical instrument, a plurality of sets of tracker ducts, a set or stop of note sounding devices, an independent 80 connection from a tracker duct of each set to the respective note sounding device, and a plurality of manually controlled means for cutting out either the bass or treble portion of each set of said tracker duct connections at will. 85

4. In a mechanical musical instrument, a plurality of sets of tracker ducts, a set or stop of note sounding devices, an independent 90 connection from a tracker duct of each set to the respective note sounding device, and a plurality of manually controlled means including a pair of stop manuals located conveniently to the hand of the operator for cutting out portions of each set of said tracker duct connections at will. 95

5. In a mechanical musical instrument, a plurality of sets of tracker ducts, a set or stop of note sounding devices, an independent 100 connection from a tracker duct of each set to the respective note sounding device, and a plurality of manually controlled means including a pair of stop manuals located conveniently to the hand of the operator for cutting out either the bass or treble portion of each set of said tracker duct connections 105 at will.

6. In a mechanical musical instrument, a set or stop of note sounding devices, two sets of tracker ducts, two sets of wind ways, each 110 of which leads from one of said sets of tracker ducts toward said set of note sounding devices, and a plurality of manually controlled means for separately connecting either of a plurality of portions of either of said sets of wind ways with the corresponding portion of 115 said set of note sounding devices at will.

7. In a mechanical musical instrument, a set or stop of note sounding devices, two sets of tracker ducts, two sets of wind ways, each 120 of which leads from one of said sets of tracker ducts toward said set of note sounding devices, and a plurality of manually controlled means for separately connecting either the bass or treble portion of each of said sets of wind ways with the corresponding portion of 125 said set of note sounding devices at will.

8. In a mechanical musical instrument, a plurality of sets of tracker ducts, a set or stop of note sounding devices, an independent 130 connection from each tracker duct of



each set to the respective note sounding device, said connection including a diaphragm valve, a passage to said valve and a single passage from said valve to the note sounding device, and manually controlled means for actuating said diaphragm valves respectively to connect each of said first-named passages with said last-named passage, for the purposes specified.

9. In a mechanical musical instrument, a plurality of sets of tracker ducts, a set or stop of note sounding devices, an independent connection from each tracker duct of each set to the respective note sounding device, said connection including a diaphragm valve, a passage to said valve and a single passage from said valve to the note sounding device, two pneumatic pressure chests for the diaphragm valves respectively of the respective independent connections and independent manually controlled means for exhausting pressure from each of said chests, for the purposes specified.

10. In a mechanical musical instrument, a plurality of sets of tracker ducts, a set or stop of note sounding devices, an independent connection from each tracker duct of each set to the respective note sounding device, said connection including a diaphragm valve, a passage to said valve and a single passage from said valve to the note sounding device, two pneumatic pressure chests for the diaphragm valves respectively of the respective independent connections, and independent manually controlled means for exhausting pressure from each of said chests, each of said manually controlled means including a stop manual and a pneumatic valve actuated thereby, for the purposes specified.

11. In a mechanical musical instrument, a plurality of sets of tracker ducts, a set or stop of note sounding devices, an independent connection from each tracker duct of each set to the respective note sounding device, said connection including a diaphragm valve, a passage to said valve and a single passage from said valve to the note sounding device, two pressure chests for the diaphragm valves respectively of the respective independent connections at the bass end of the instrument, two pressure chests for similarly controlling the valve diaphragms at the treble end of the instrument, and independent manually controlled means for exhausting pressure from the respective chests, for the purposes specified.

12. In a mechanical musical instrument, a plurality of sets of tracker ducts, a set or stop of note sounding devices, an independent connection from each tracker duct of each set to the respective note sounding devices, said connection including a diaphragm valve, a passage to said valve and a single passage from said valve to the note sounding

device, two pressure chests for the diaphragm valves respectively of the respective independent connections at the bass end of the instrument, two pressure chests for similarly controlling the valve diaphragms at the treble end of the instrument, and independent manually controlled means for exhausting pressure from said chests, each of said manually controlled means including a stop manual and a pneumatic valve actuated thereby, for the purposes specified.

13. In a mechanical musical instrument, a plurality of sets of tracker ducts, a plurality of sets or stops of note sounding devices, an independent connection from each tracker duct of each set leading to the sounding devices for the corresponding note in each of said stops, and a plurality of manually controlled means for permitting and preventing the actuation of any stop of said note sounding devices from the respective sets of said tracker ducts at will, for the purposes specified.

14. In a mechanical musical instrument, a plurality of sets of tracker ducts, a plurality of sets or stops of note sounding devices, an independent connection from each tracker duct of each set leading to the sounding devices for the corresponding note in each of said stops, and a plurality of manually controlled means for permitting and preventing the actuation of any stop of said note sounding devices from the respective sets of said tracker ducts at will, each of said manually controlled means including a pair of stop manuals and a valve controlled by each of them.

15. In a mechanical musical instrument, two tracker ducts, a note sounding device and a connection between said ducts and said note sounding device, including a valve board having a transverse discharge passage connected to said note sounding device and opening on the opposite faces of said board, and two passages each connected to one of said tracker ducts and extending respectively to the opposite faces of said board, and a diaphragm on each face of said board, each of said diaphragms covering one end of said first-named passage and the end of one of said second-named passages, for the purposes specified.

16. In a mechanical musical instrument, two tracker ducts, a note sounding device and a connection between said ducts and said note sounding device, including a valve board having a transverse discharge passage connected to said note sounding device and opening on the opposite faces of said board, two passages each connected to one of said tracker ducts and extending respectively to the opposite faces of said board and a diaphragm on each face of said board, each of said diaphragms covering one end of said first-named passage and the end of one of



said second-named passages, means for connecting all of said passages with a source of pneumatic pressure, a wind chest on each side of said board, and independent means for alternatively admitting pressure to and exhausting it from each of said wind chests for actuating said diaphragms, for the purposes specified.

17. In a mechanical musical instrument, in combination, a plurality of sets of tracker ducts, a set or stop of note sounding devices having connections for the respective notes thereof to the respective ducts of each of said sets, and manually controlled means for preventing or permitting the operation of said note sounding devices from the sets of tracker ducts respectively said manually controlled means including two series of pneumatically controlled valves controlling chambers for the respective series, and means for changing the pressure in the last said chambers.

18. In a mechanical musical instrument, in combination, a set or stop of note sounding devices, two sets of tracker ducts and connections therefrom for actuating the respective devices, manually controlled means for rendering either set of connections inoperative or operative at will another set or stop of note sounding devices of different character and connections from the said two sets of tracker ducts for actuating the respective devices thereof, and manually controlled means for rendering each set of last said connections inoperative or operative at will independently of the first said tracker duct connections.

19. In a mechanical musical instrument, in combination, two or more sets of sounding devices, two sets of tracker ducts and means controlled thereby for actuating any one sounding device from a corresponding duct of each set of ducts, and manually controlled means for rendering operable or inoperable the means for actuating the sounding devices of either set thereof from the tracker ducts of either set without affecting either the other sets of sounding devices or the actuation of that same set from the other set of tracker ducts.

20. Mechanical musical apparatus having in combination for each one of several notes, a plurality of note sounding devices for that note, a plurality of pneumatics controlling the respective devices, two independent passages having connections for actuating all the said pneumatics for said note, means for severally closing each said connection between the passages and the pneumatics, and separate tracker ducts and controlling means for the respective passages, whereby any of said note sounding devices may be played at will from either of said tracker ducts.

21. Mechanical musical apparatus having in combination for each one of several notes,

a plurality of note sounding devices for that note, a plurality of pneumatics controlling the respective devices, two independent passages having connections for actuating all the said pneumatics for said note, means for severally closing each said connection between the passages and the pneumatics, said means comprising a diaphragm covering two ports in each said connection and pneumatic means for pressing the diaphragm against said ports.

22. In combination with a stop or set of note sounding devices of like character and the pneumatics for causing the respective notes to sound, two controlling passages for each of said pneumatics, controlling valves and connections for each said passage for sounding the respective notes, two series of diaphragms and cooperating ports providing one diaphragm for each of said connections respectively, and two chambers and wind connections respectively controlling the said series of diaphragms.

23. In combination with sounding devices for the respective notes to be sounded and as a means for permitting or preventing their being sounded through either of two pneumatic connections for respective notes, a pair of chambers, pneumatic connections thereto a set of diaphragms in each chamber for the respective pneumatics, a duct from each pneumatic opening against one of said diaphragms in each chamber, a plurality of ducts each opening against one of the diaphragms, and means for varying the pressure in the said chambers to control the sets of diaphragms therein.

24. In combination, a pneumatic and its controlling duct 54, a chamber having a port for the duct 54, an adjacent port cooperating therewith, and a diaphragm secured against said ports, a duct communicating with the last said ports, means for varying the pressure in the last said duct to operate the pneumatic, and means for varying the pressure in said chamber to permit or prevent such operation, and a similar chamber, port, adjacent port, diaphragm, duct, and pressure varying means in similar combination with the first said duct, whereby the said pneumatic may be operated from either of two independent connections at will.

25. In combination, a plurality of sets of note sounding devices having corresponding sets of pneumatics for causing them respectively to sound, two sets of actuating passages for independently operating the respective pneumatics, and each connected to act on pneumatics in different sets, and a plurality of devices for cutting off communication between either set of actuating passages and the pneumatics, and separate sets of tracker ducts and controlling connections for the two sets of actuating passages.

26. In combination with a plurality of sets



of note sounding devices, two sets of tracker ducts and connections from each set of ducts for causing the respective notes to be sounded, a pair of stops for each set of sounding devices one of said pair of stops having connections for permitting or preventing the set of sounding devices being operated by one of the sets of tracker ducts, and the other of said pair of stops having connections for permitting or preventing the set of sounding devices being operated by the other of said sets of tracker ducts.

27. In combination, a plurality of sets of note sounding devices, a set of tracker ducts and connections therefrom for operating the note sounding devices, a set of draw stops and devices governing the said connections for permitting or preventing the operation of the respective sets of sounding devices by said tracker ducts, a second set of tracker ducts and connections therefrom for operating the note sounding devices, and a second set of draw stops and devices governing the last said connections for permitting or preventing the operation of the respective sets of sounding devices by the last tracker ducts.

28. In combination with a set of note sounding devices having a set of pneumatics for the respective notes, two sets of passages, for independently controlling the respective pneumatics, and each having connection to its said pneumatic, two sets of pneumatic means for cutting off connection between the pneumatics and the respective sets of passages, and two chambers for such respective sets of pneumatic means having means for varying the pressure therein and actuating the said pneumatic means.

29. In combination with a pneumatic, in which pressure is to be varied, a valve board having a pair of adjacent ports and a diaphragm covering them, another pair of adjacent ports and a diaphragm covering them, one of each pair of said ports having communication with the said pneumatic, means for independently varying the pressure in each of the other ports to thereby vary the pressure in the said pneumatic, and independent means for varying the pressure on the two diaphragms independently and thereby controlling the said ports.

30. In combination with a set of ducts, in which pressure is to be varied, a chamber having a set of pairs of ports, to one of each pair of which the said ducts respectively lead, a set of pneumatic connections for severally varying the pressures in the others of said ports, a set of diaphragms in said chamber for the respective pairs of ports, means for varying the pressure in the said chamber to simultaneously control the said ports, a second such chamber, ports, diaphragms, set of connections, and diaphragms similarly connected to the first said ducts, and independent means for varying the pressure in said second chamber, whereby the said ducts may be controlled independently from either of the said sets of connections.

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

GEORGE B. KELLY.

Witnesses:

GEO. L. COOPER,  
OLIN A. FOSTER.