

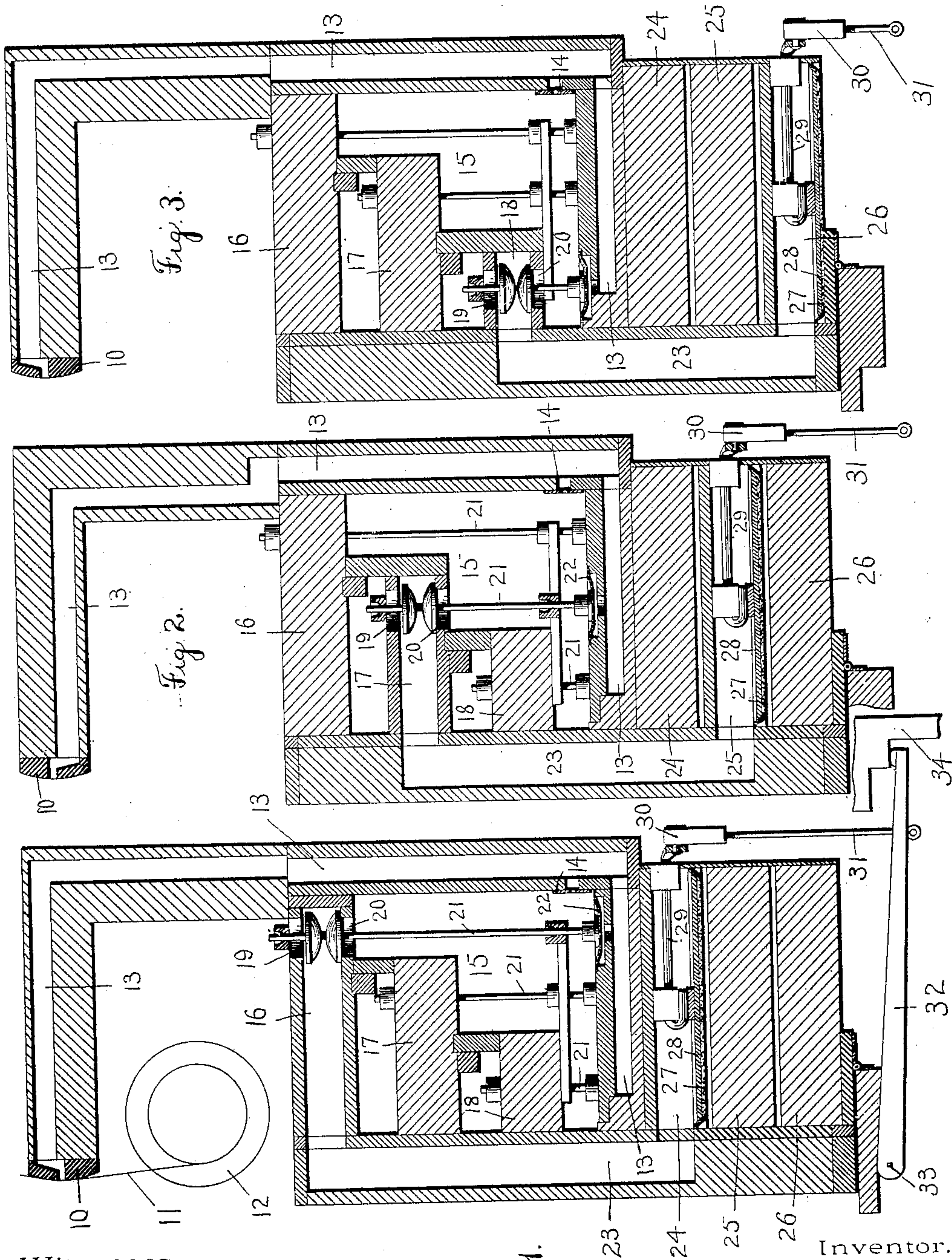
(No Model.)

3 Sheets—Sheet 1.

M. S. WRIGHT.
AUTOMATIC MUSICAL INSTRUMENT.

No. 596,730.

Patented Jan. 4, 1898.



Witnesses.

W. J. Baldwin
E. M. Haly.

Fig. 1.

Inventor.
M. S. Wright.

By
Southgate & Southgate
Attorneys.

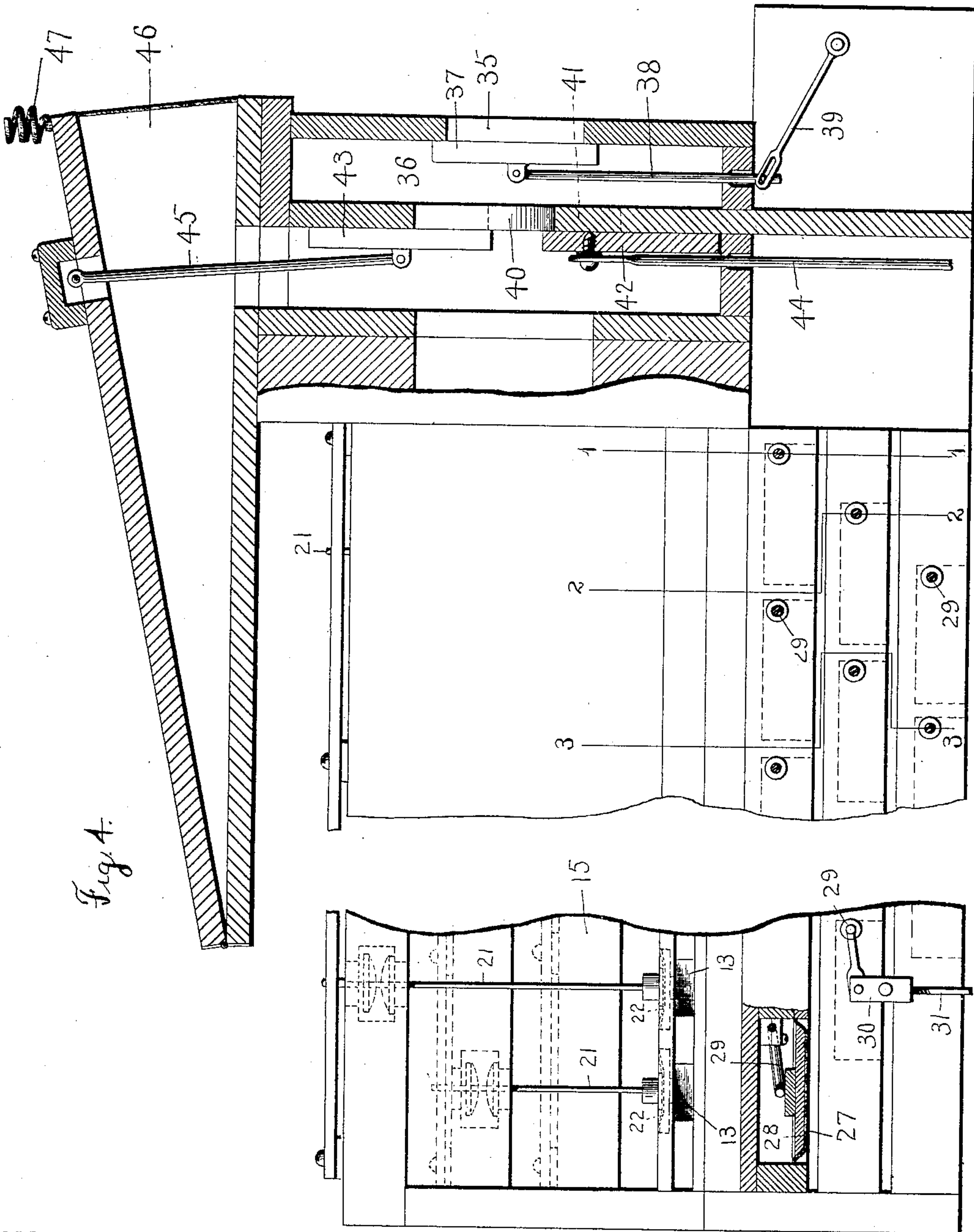
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3 Sheets—Sheet 2.

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W. J. Baldwin
E. M. Healy

Inventor.

M. S. Wright

By

Smithgate & Smithgate
Attorneys.

(No Model.)

3 Sheets—Sheet 3.

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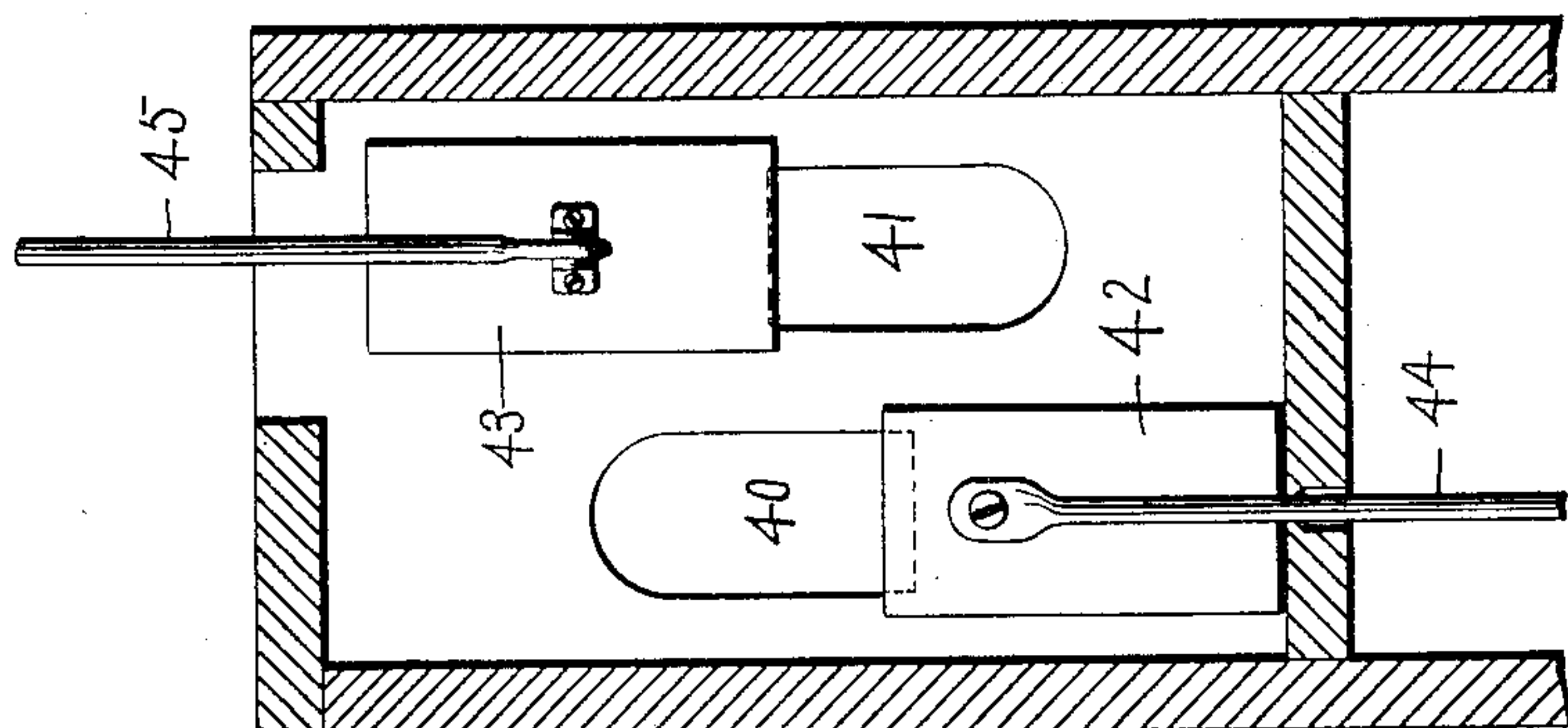


Fig. 7.

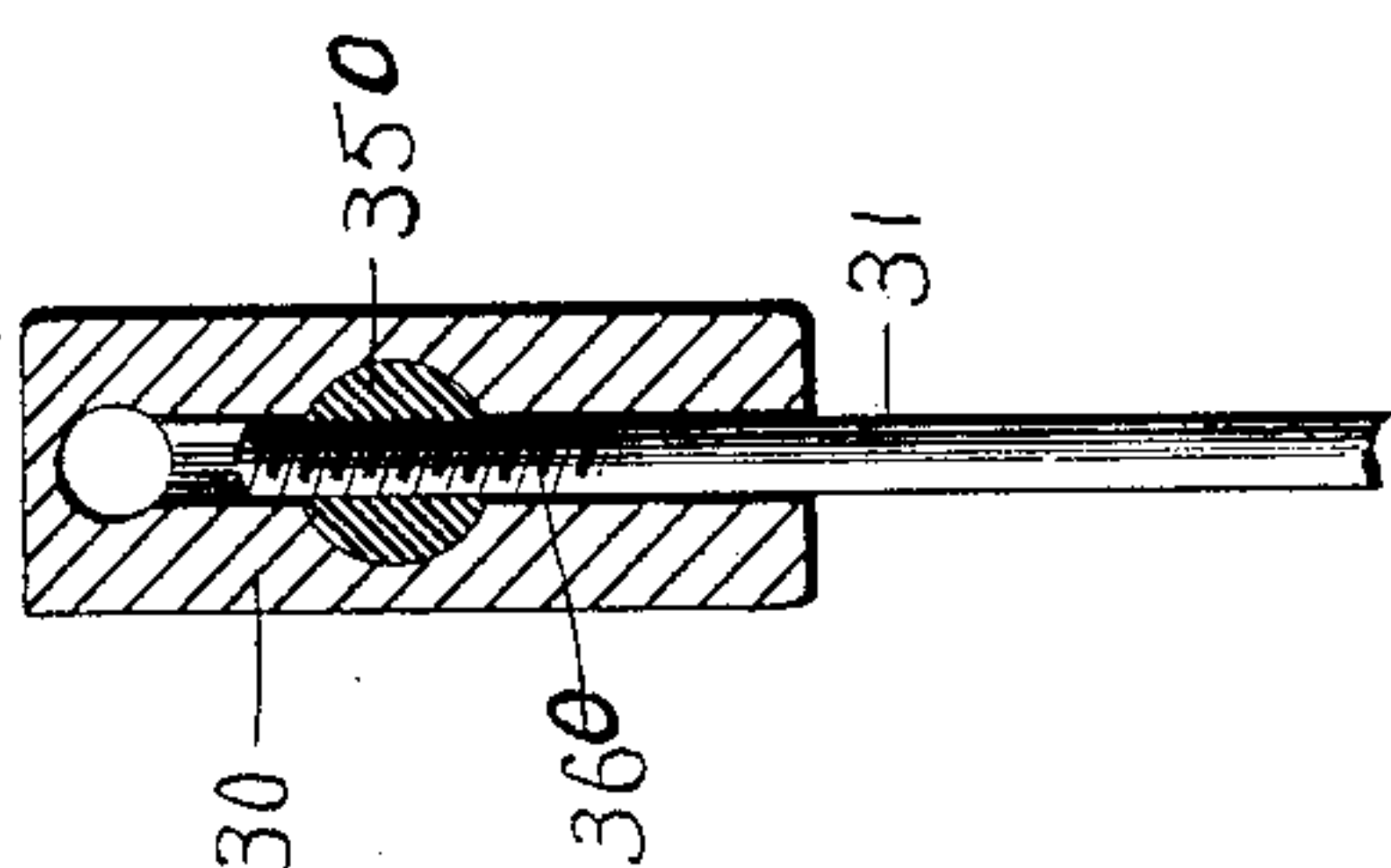


Fig. 6.

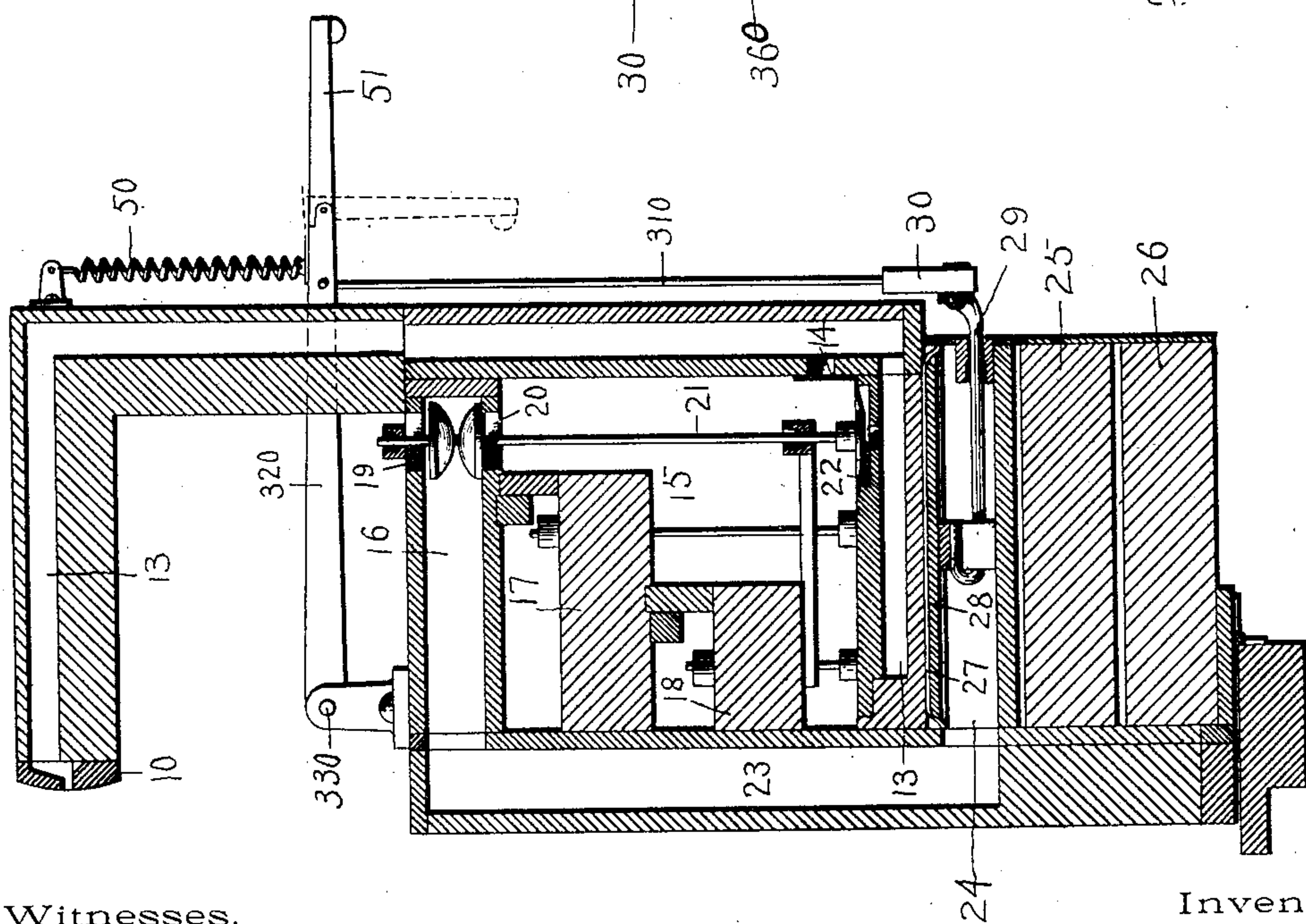


Fig. 5.

Witnesses.

W. J. Baldwin
E. M. Healy.

Inventor.

M. S. Wright.

By
Southgate & Southgate
Attorneys.

UNITED STATES PATENT OFFICE.

MORRIS S. WRIGHT, OF WORCESTER, MASSACHUSETTS.

AUTOMATIC MUSICAL INSTRUMENT.

SPECIFICATION forming part of Letters Patent No. 596,730, dated January 4, 1898.

Application filed January 29, 1897. Serial No. 621,201. (No model.)

To all whom it may concern:

Be it known that I, MORRIS S. WRIGHT, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented a new and useful Improvement in Automatic Musical Instruments, of which the following is a specification.

My invention relates to that class of automatic musical instruments which are controlled by rolls of perforated paper; and the object of my invention is to provide compact, simple, and efficient pneumatic-actuating devices for pianos or similar instruments.

To these ends my invention consists of the parts and combinations of parts, as hereinafter described, and more particularly pointed out in the claims at the end of this specification.

In the accompanying three sheets of drawings, Figure 1 is a sectional view on the line 1 1 of Fig. 4. Fig. 2 is a sectional view on the line 2 2 of Fig. 4. Fig. 3 is a sectional view on the line 3 3 of Fig. 4. Fig. 4 is a rear view of a pneumatic-actuating mechanism constructed according to my invention, partially broken away and with its tracker-board removed. Fig. 5 is a sectional view similar to Fig. 1, illustrating a modified form of construction. Fig. 6 is an enlarged detail view illustrating an adjustable connection which I preferably employ, and Fig. 7 is a sectional view illustrating an arrangement of controlling-valves.

A pneumatic-actuating device for musical instruments constructed according to my invention comprises a main vacuum-chamber, a series of primary pneumatics or diaphragms located in said vacuum-chamber, a tracker-board, ducts or passages leading from the tracker-board to operate the primary pneumatics, main operating pneumatics or diaphragms, and valve-controlled passages leading from the main vacuum-chamber to the operating-pneumatics.

The main pneumatics or diaphragms are arranged to turn roller-rods or small rock-shafts, which are connected by links to operate pivoted levers, which levers I preferably arrange to engage the abstracts of ordinary upright-piano actions. If preferred, however, the pivoted levers may be made to strike downward,

so that they may be utilized to engage the keys of a piano or similar instrument; and where this construction is adopted my pneumatic-actuating devices may be mounted in a separate framework from the musical instrument in connection with which they are to be employed. In my preferred construction, however, I have arranged my pneumatic-actuating devices especially with a view of securing the same permanently inside the casing of an upright piano, so that said devices may occupy the space immediately above the keyboard of said piano. To this end the tracker-board and paper-winding mechanism are mounted above the vacuum-chamber, the passages leading from the tracker-board to the pneumatics extend down behind the rear of the main vacuum-chamber, the valve-chambers which contain the valves operated by the primary pneumatics are arranged in banks above the main vacuum-chamber, the main or operating pneumatics are arranged in banks immediately below the main vacuum-chamber, and the passages leading to said main diaphragms extend down in front of the main vacuum-chamber. This construction enables me to provide an extremely compact pneumatic-operating mechanism for musical instruments, and as the primary valve-stems are arranged vertically I have provided a construction in which the parts will be restored to their normal position by gravity without the employment of springs or other instrumentalities.

The roller-rods or rock-shafts actuated by the main diaphragms or pneumatics are adjustably connected to their links by means of wooden connecting-pieces having metallic bushings therein for receiving threaded portions of the links.

Pneumatic playing devices of that class to which my invention relates have heretofore ordinarily been directly connected to a bellows or pumping device for actuating the same. In practice I have found that it is not desirable to connect devices of this character directly to their bellows, as it is impossible to maintain an exactly constant air-pressure by the use of bellows, and any variation therein will produce variations in the action of the pneumatic playing devices which are directly connected thereto. This form of connection

I have also found to be objectionable, as the different chords or notes which are produced require different amounts of wind and a direct connection between the pneumatic playing devices and the bellows for operating the same will not provide any reserved capacity for producing those notes or chords which require a considerable volume of air. To overcome these objections, I have combined pneumatic playing devices constructed according to my invention with a controlling-valve, which is connected to and actuated from a supplemental spring-pressed bellows or pneumatic. By means of this construction a uniform air-pressure will be maintained and the spring-pressed bellows or pneumatic will form a supplemental reservoir, which will act automatically to supply the wind-pressure required to produce heavy chords or notes. In addition to the automatic regulating-valve I also provide a controlling-valve for opening a direct connection between the bellows and my pneumatic playing devices when it is desired to produce unusually loud or brilliant effects, and I also provide a main shut-off valve, which will be closed when the devices are not in use or when the paper is being re-rolled.

Referring to the drawings and in detail, 10 designates a tracker-board of ordinary construction having orifices to coöperate with the perforations in the paper 11, which may be drawn thereover by means of a winding-roller 12. Extending from the tracker-board 10, down behind a main vacuum-chamber 15, are passages 13. As shown most clearly in Figs. 1 and 2, the passages 13 may be arranged in different planes, so as to allow passages of considerable area to be used in connection with a comparatively narrow tracker-board. Near their lower ends the passages or ducts 13 are connected to the main vacuum-chamber 15 by means of small passages formed in plates 14.

Primary pneumatics or diaphragms 22 are located at the bottom of the main vacuum-chamber 15, and each of said primary pneumatics or diaphragms is connected to a passage 13.

Arranged in banks above the main vacuum-chamber 15 are valve-controlled passages 16, 17, and 18.

The valve-controlled passages 16, 17, and 18 are provided with ports 19 and 20, connected to the outer air and main vacuum-chamber 15, respectively.

The primary valve-stems 21 are arranged vertically in the main vacuum-chamber 15, and are provided with suitable valves controlling the ports 19 and 20.

The valve-controlled passages 16, 17, and 18 open into vertical passages 23, extending down in front of the main vacuum-chamber 15 to the operating or main pneumatics 24, 25, and 26, which are arranged in banks below the vacuum-chamber.

The main or operating pneumatics each

comprise a flexible diaphragm 27, of leather or similar material, having a wooden follower 28, arranged to act upon and turn a roller-rod or rock-shaft 29. The rock-shafts 29 extend out through suitable stuffing-boxes and are provided with extending arms or cranks engaging wooden connecting-pieces 30. As shown most clearly in Fig. 6, the wooden connecting-pieces 30 are provided with metallic bushings 350 for receiving the threaded ends 360 of downwardly-extending links 31. The links 31 pass through suitable levers 32, said levers 32 being pivoted at their front ends, as at 33, and being provided at their rear ends with abutments adapted to engage, preferably, with the abstracts 34 of the ordinary upright-piano action.

In the drawings I have illustrated a pneumatic-actuating mechanism comprising three banks of primary pneumatics and three banks of operating or main pneumatics. It is evident, however, that the number of banks employed may be varied, and in practice I have ordinarily employed more than three sets of main or operating pneumatics, three such sets of pneumatics having been shown in the drawings for the purposes of illustration merely. To operate a pneumatic action as thus organized, the vacuum-chamber may be connected to any of the ordinary suction or air-pumping devices, which will exhaust the air therefrom and will also draw air from the passages 13 through the small orifices in the plates 14. When a perforation or hole in the paper 11 passes a corresponding orifice in the tracker-board 10, the external air-pressure will be admitted to a passage 13, so as to raise one of the primary diaphragms or pneumatics 22, which will raise a primary valve-stem 21, shutting the port 19 and opening a port 20. When a port 20 is opened, air will be drawn into the vacuum-chamber from one of the passages 23, which will exhaust the air from one of the main pneumatics, raising one of the flexible diaphragms, which, through its roller-rod 29, connecting-link 31, and pivoted lever 32, will operate upon the abstract 34 of the piano or similar musical instrument, producing the desired note.

The arrangement of controlling-valves which I preferably employ is most clearly illustrated in Figs. 4 and 7. As shown, 35 indicates a passage which may be connected to a bellows or any ordinary air-pumping device and which opens into a valve-chamber 36. Mounted in the valve-chamber 36 is a main shut-off valve 37, which may be actuated from a rock-shaft by means of a link 38. When the instrument is not in use or when the paper is being re-rolled, the main shut-off valve 37 will be closed, which will prevent the air being drawn from the main vacuum-chamber 15 and the instrument from playing. Opening from the valve-chamber 36 are ports 40 and 41. The port 40 is controlled by a slide-valve 42, which may be actuated by a link 44. When the slide-valve 42 is opened,

a direct connection between the main vacuum-chamber and the bellows may be provided, and this valve will be opened only when it is desired to produce unusually loud or brilliant effects. Coöperating with the port 41 is a regulating slide-valve 43, which is connected by a link 45 to the upper arm of a bellows or pneumatic 46. The bellows 46 is normally distended or drawn upward by means of a coiled spring 47. By means of this construction it will be seen that the spring-pressed bellows 46 will act as a regulating device to control the suction or pressure exerted by the main bellows, and will also form a reservoir or reinforcing device for producing chords or notes requiring an unusual volume of wind.

In some cases instead of housing a pneumatic-action constructed according to my invention within the piano-casing I may employ the same as an independent instrumentality in which the levers may be arranged to act upon the keys of a piano in the same manner as the fingers of a performer, and I have illustrated such a construction in Fig. 5. In this figure it will be seen that the main or operating pneumatics occupy an inverted position from that illustrated in Figs. 1 to 3, or the flexible diaphragms 27 are arranged at the top rather than the bottom of the diaphragm-chambers. By means of this construction the roller-rods 29 will be arranged to pull down on connecting-links 310, so as to pull down on operating-levers 320, which are pivoted at their front ends, as at 330. The operating-levers 320 are normally held up by means of light coiled springs 50 and are provided at their rear ends with pivoted sections 51, which are connected thereto by means of jackknife-joints, so that they can be folded down out of the way when the attachment is not in use.

I am aware that other changes may be made in the construction of automatic musical instruments by those who are skilled in the art without departing from the scope of my invention as expressed in the claims. I do not wish, therefore, to be limited to the forms which I have shown and described; but

What I do claim, and desire to secure by Letters Patent of the United States, is—

1. In an automatic musical instrument, the combination of a vacuum-chamber, a plurality of vertical primary valve-stems arranged in banks in said vacuum-chamber, main diaphragm-chambers or operating-pneumatics arranged in banks below the main vacuum-chamber, and valve-controlled passages leading from the vacuum-chamber to said pneumatics, substantially as described.

2. The combination of a main vacuum-chamber, primary valve-stems located therein, a tracker-board, connecting-passages leading from the tracker-board to primary pneumatics, operating-diaphragm chambers or

pneumatics, and valve-controlled passages leading from the vacuum-chamber to said pneumatics, said valve-controlled passages and said connecting-passages being located in the front and rear of the vacuum-chamber respectively, substantially as described.

3. In an automatic musical instrument, the combination of a vacuum-chamber, operating-diaphragm chambers or pneumatics, passages leading to said pneumatics, each of said passages having ports opening to the vacuum-chamber and air respectively, valve-stems arranged in banks in said vacuum-chamber, each of said primary valve-stems having valves for controlling two of said ports, and primary diaphragms or pneumatics operatively connected to said valve-stems, a tracker-board, and passages connecting the tracker-board and said primary diaphragms, substantially as described.

4. In an automatic musical instrument, the combination of a vacuum-chamber 15, primary pneumatics 22 located therein, a tracker-board 10, passages 13 extending from the tracker-board behind the vacuum-chamber 15 to the pneumatics 22, vertical valve-stems 21 located in the vacuum-chamber, valve-chambers arranged in banks above the vacuum-chamber 15, passages 23 leading down in front of the vacuum-chamber 15, main pneumatics connected thereto and arranged in banks below the vacuum-chamber, and operating connections controlled by the main pneumatics, said operating connections comprising rock-shafts 29, links 31 and pivoted levers 32, substantially as described.

5. In a musical instrument, the combination of pneumatically-actuated operating devices, a main shut-off valve, a spring-pressed, auxiliary bellows or pneumatic, a pressure-regulating valve controlled thereby, and an independent controlling-valve, substantially as described.

6. In a musical instrument, the combination of pneumatically-actuated operating devices, a main shut-off valve 37 for cutting off the wind-pressure when the instrument is not in use or the paper is being rerolled, and controlling-valves 42 and 43, one of said controlling-valves being connected to and actuated by a spring-pressed, auxiliary bellows 46, and the other of said controlling-valves being capable of an independent action to provide a direct connection between the pneumatic devices and main bellows when desired, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

MORRIS S. WRIGHT.

Witnesses:

PHILIP W. SOUTHGATE,
J. BRAINERD HALL.