

No. 886,569.

PATENTED MAY 5, 1908.

F. W. WOOD.  
EXPRESSION DEVICE.  
APPLICATION FILED AUG. 24, 1907.

2 SHEETS—SHEET 1.

Fig. 1.

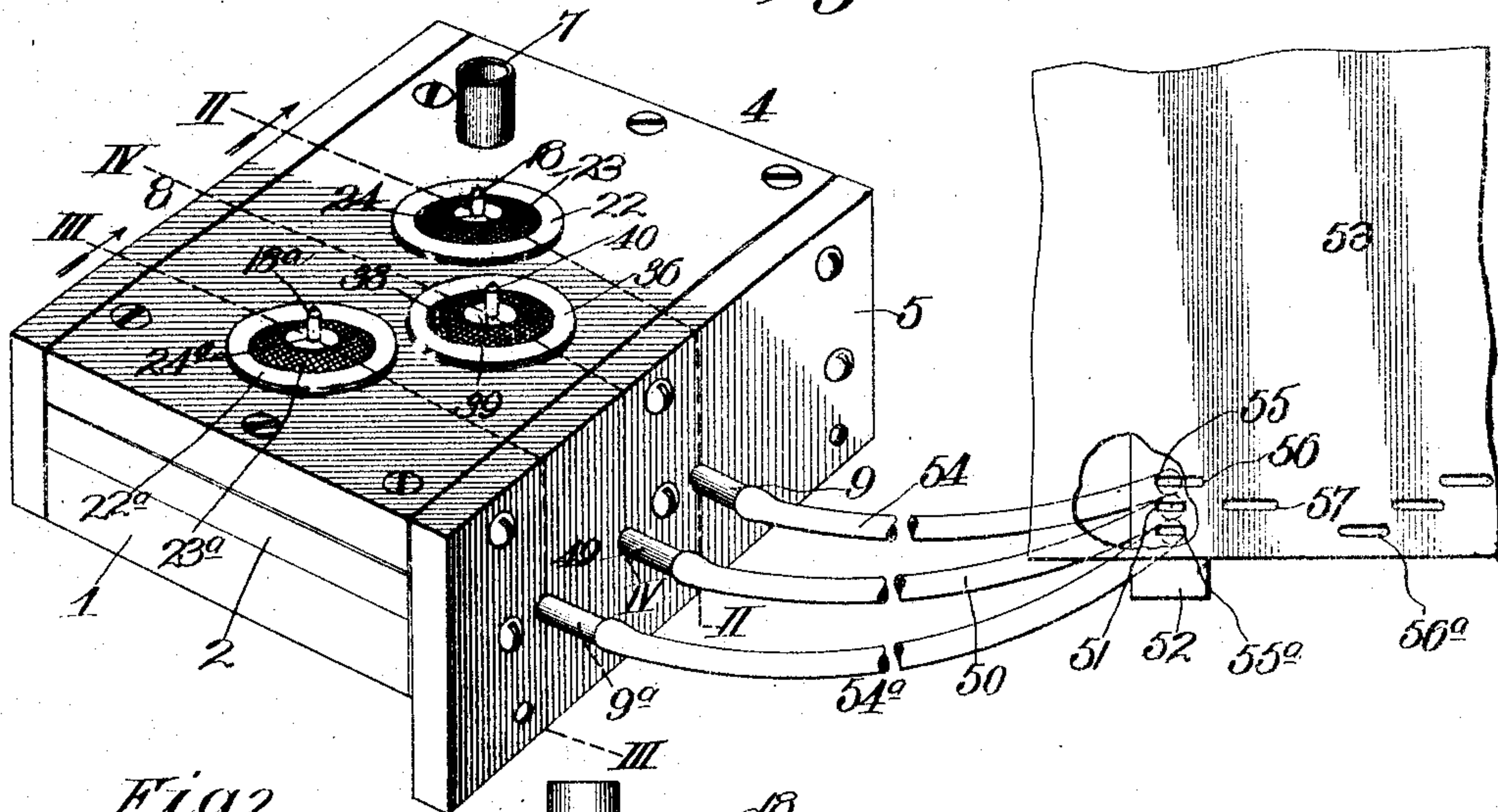


Fig. 2.

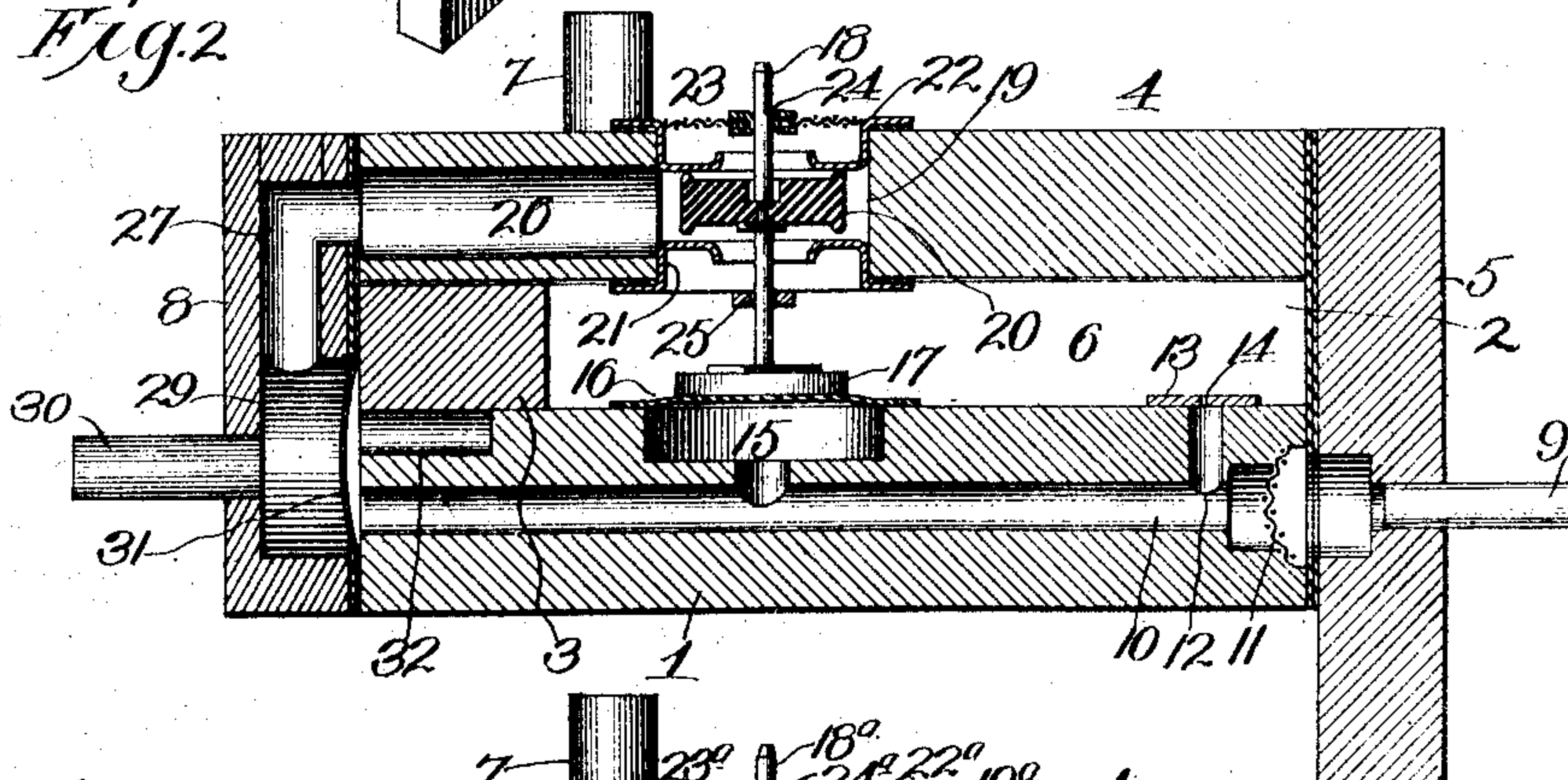
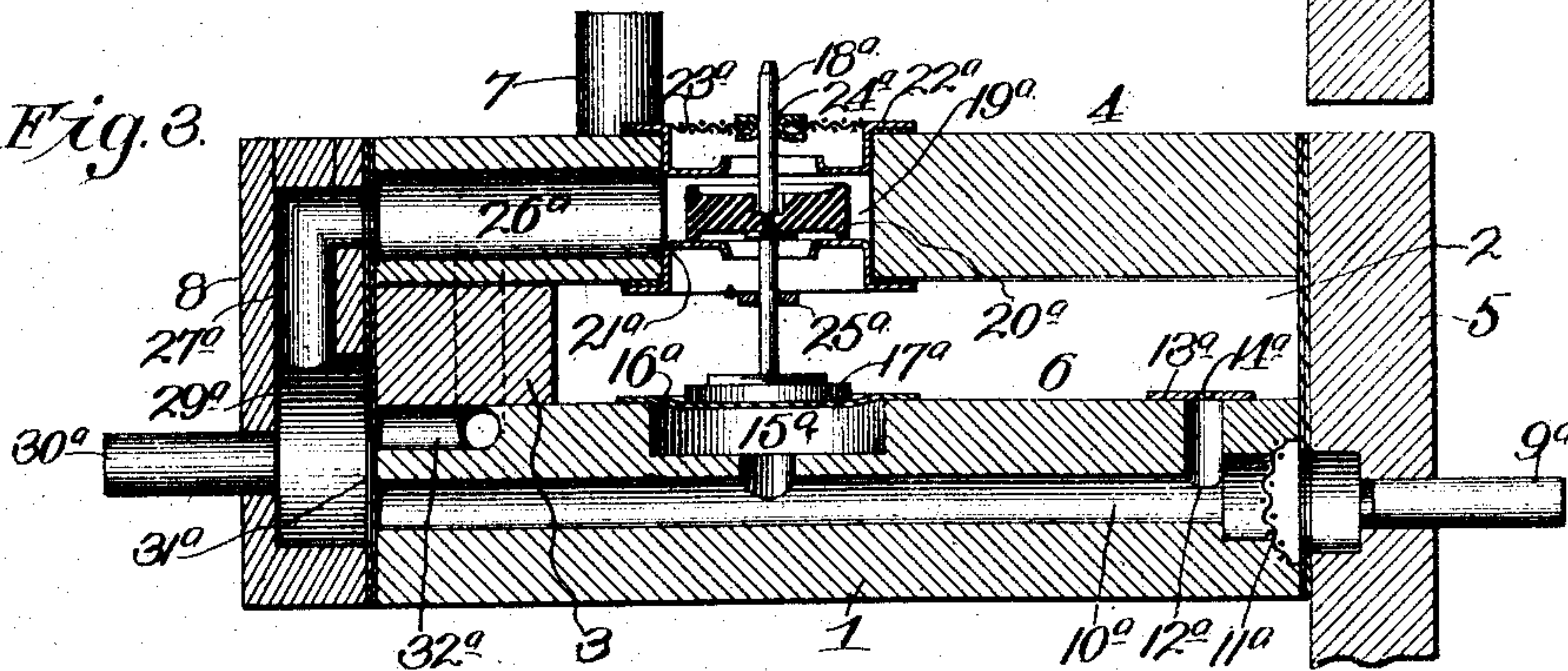


Fig. 3.



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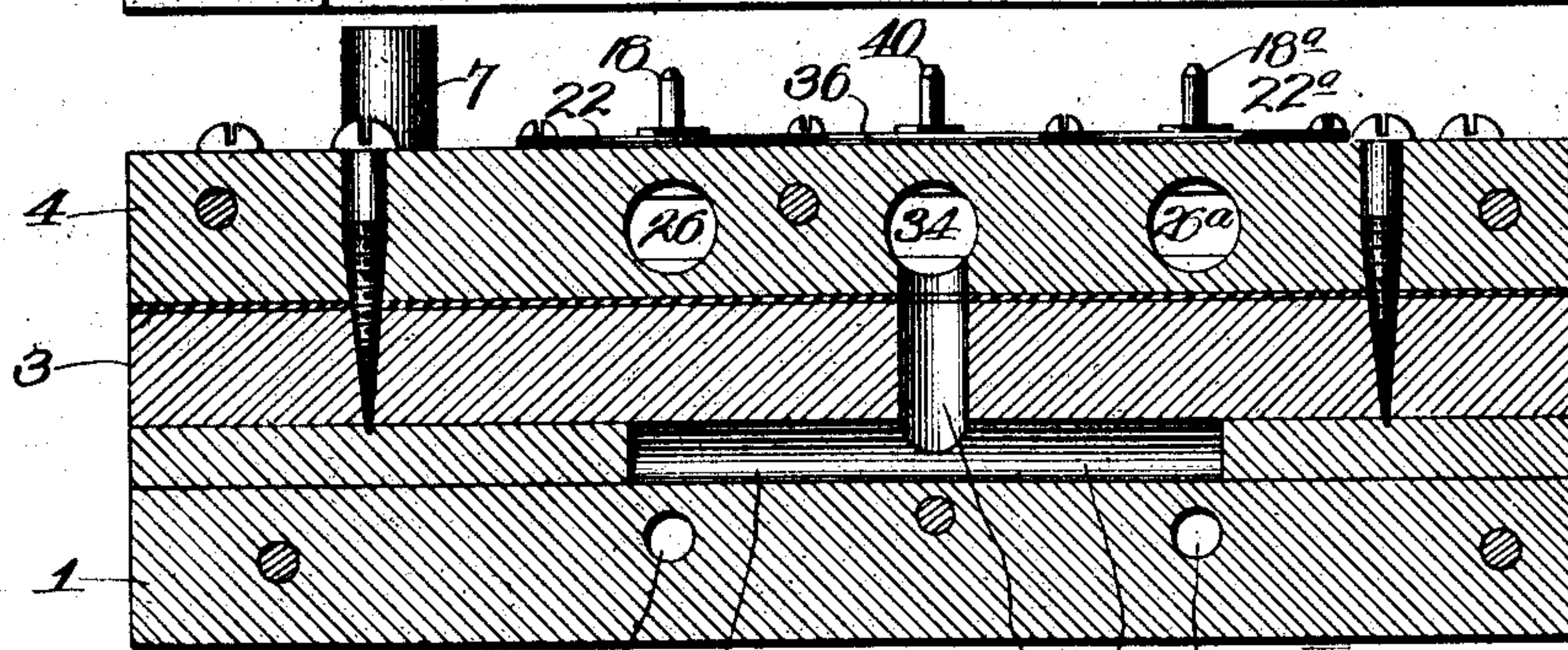
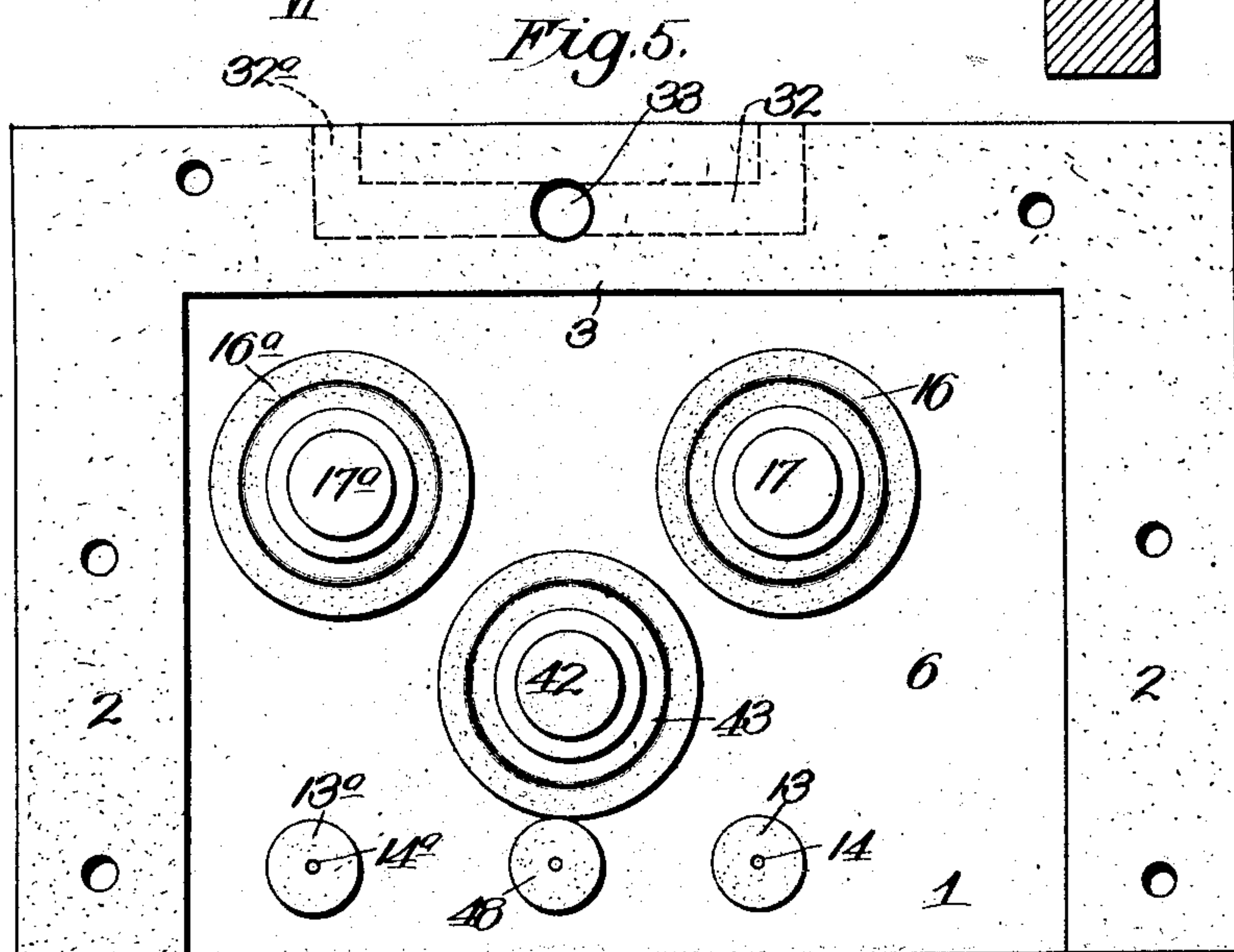
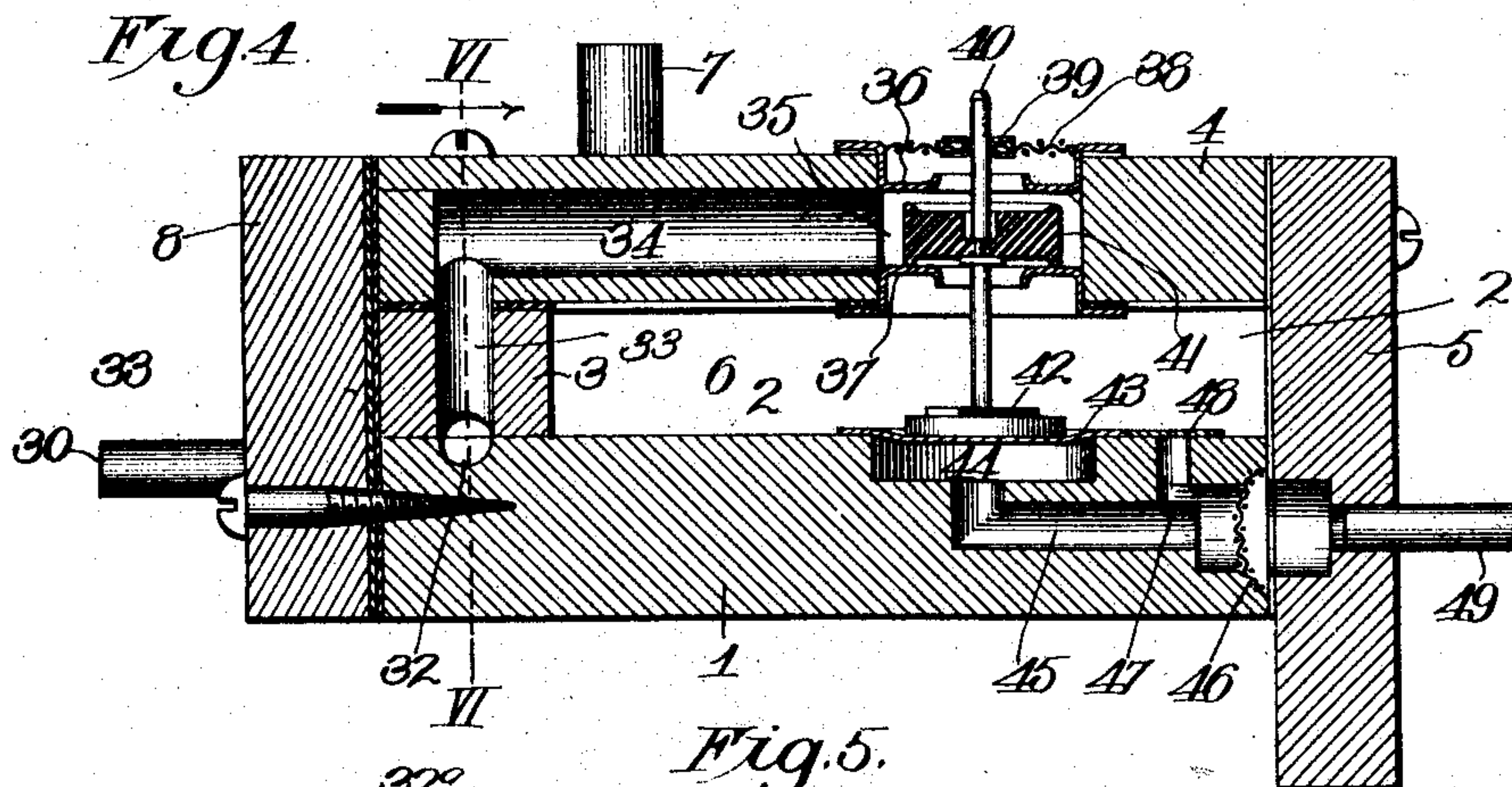
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EXPRESSION DEVICE.

APPLICATION FILED AUG. 24, 1907.

2 SHEETS—SHEET 2.



Witnesses  
Frank R. Gore.  
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10 32 Fig. 6. 33 32<sup>a</sup> 10<sup>a</sup> Inventor  
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# UNITED STATES PATENT OFFICE.

FREDERICH W. WOOD, OF KANSAS CITY, MISSOURI, ASSIGNOR TO THE BERRY-WOOD PIANO PLAYER CO., OF KANSAS CITY, MISSOURI, A CORPORATION OF MISSOURI.

## EXPRESSION DEVICE.

No. 886,569.

Specification of Letters Patent.

Patented May 5, 1908.

Application filed August 24, 1907. Serial No. 390,052.

*To all whom it may concern:*

Be it known that I, FREDERICH W. WOOD, a citizen of the United States, residing at Kansas City, in the county of Jackson and State of Missouri, have invented certain new and useful Improvements in Expression Devices, of which the following is a specification.

This invention relates to expression devices for pneumatic instrument players, and more especially to that type whereby the action of the loud and soft pedals of a musical instrument are controlled through the admission of air by the note-sheet to the tracker-bar, and my object is to produce an efficient and reliable expression device of the character outlined which is of simple, small, compact and inexpensive construction.

To this end the invention consists in certain novel and peculiar features of construction and organization as hereinafter described and claimed; and in order that it may be fully understood reference is to be had to the accompanying drawings, in which:—

Figure 1, is a view showing the expression device in perspective and a portion of the tracker-bar and note-sheet in plan view, with the tracker-bar connected to the expression device and the note-sheet broken away to disclose the openings in the tracker-bar connected to the expression device. Fig. 2, is a vertical section taken on the line II—II of Fig. 1, but on an enlarged scale and showing the operative parts in the positions they occupy when one of the perforations of the note-sheet is admitting air to the expression device. Fig. 3, is a section on the line III—III of Fig. 1, on the same scale as Fig. 2. Fig. 4, is a section on the line IV—IV of Fig. 1. Fig. 5, is a plan view of the expression device with the top plate and the side walls omitted. Fig. 6, is a section taken on the line VI—VI of Fig. 4.

In the said drawings, 1 indicates the bottom of the device provided with upwardly projecting end walls 2 and back wall 3.

4 is the top wall and 5 a wall which closes one side and in conjunction with the other parts named completes the exhaust-chamber 6 connected by an exhaust-tube 7 carried by the top with a tube (not shown) to suitable means for maintaining a constant suction from said chamber, and 8 is a plate secured to the device at the opposite side from wall 5.

9 and 9<sup>a</sup> indicate tubes extending through wall 5 and communicating with passages 10 and 10<sup>a</sup> respectively, extending through the bottom and provided with screens 11 and 11<sup>a</sup> at their front ends to exclude lint and dust.

12 and 12<sup>a</sup> are branch passages extending upward from passages 10 and 10<sup>a</sup> respectively covered by caps 13 and 13<sup>a</sup> having vent-holes 14 and 14<sup>a</sup> for the purpose of providing means for exhausting air from passages 10 and 10<sup>a</sup> through the exhaust-chamber 6.

15 and 15<sup>a</sup> are chambers communicating with passages 10 and 10<sup>a</sup> respectively, and covered by flexible diaphragms 16 and 16<sup>a</sup> equipped with wear-disks 17 and 17<sup>a</sup> for engagement with the lower ends of valve-stems 18 and 18<sup>a</sup> extending up through the top and chambers 19 and 19<sup>a</sup> respectively, in said top and equipped in the latter with valves 20 and 20<sup>a</sup>, the said valves normally resting on the underlying plates 21 and 21<sup>a</sup> forming the bottoms of said valve-chambers 19 and 19<sup>a</sup> and centrally perforated to establish communication between the exhaust-chamber and said valve-chambers.

22 and 22<sup>a</sup> are similar but inverted plates forming the tops of the valve-chambers and also centrally perforated to establish communication between the valve-chambers and the atmosphere, and bridging the last-named plates so as to exclude lint and particles in general foreign to the air, from the valve chambers are screens 23 and 23<sup>a</sup> having central eyeleted openings 24 and 24<sup>a</sup> which eyeleted openings in conjunction with the cross bars 25 and 25<sup>a</sup> form guides for the valve stems to insure direct endwise movement thereof.

26 and 26<sup>a</sup> indicate passages extending from chambers 19 and 19<sup>a</sup> respectively, to and communicating with angular passages 27 and 27<sup>a</sup> in plate 8, the last-named passages opening into chambers 29 and 29<sup>a</sup> in communication with tubes 30 and 30<sup>a</sup> connected by flexible tubes (not shown) to bellows or equivalent means for operating the loud and soft pedals of a musical instrument, not shown, these connections and means for operating the bellows being common in the art. The chambers 29 and 29<sup>a</sup> are provided with flexible diaphragms 31 and 31<sup>a</sup> which normally close the rear ends of passages 10 and 10<sup>a</sup> and also of angular passages 32 and 32<sup>a</sup> connected to a passage 33



in communication with a passage 34 in the top leading to a valve-chamber 35 connected to the atmosphere through a perforated plate 36 and to the exhaust-chamber through a similar but inverted plate 37, the communication with the atmosphere being through a screen 38 having an eyeleted opening 39 for the stem 40 of a valve 41 located in chamber 35, the lower end of said stem resting on the wear-disk 42 of a flexible diaphragm 43 bridging a chamber 44 in communication with a passage 45 screened at its front end as at 46, said passage having a passage 47 connected to the exhaust-chamber by a vent-hole cap 48. Passage 45 is also connected to a tube 49 connected by a flexible tube 50 to an opening 51 in a tracker-bar 52 over which a note-sheet 53 passes. Tubes 9 and 9<sup>a</sup> are also connected by flexible tubes 54 and 54<sup>a</sup> to tracker-bar openings 55 and 55<sup>a</sup>, and in line with openings 55 and 55<sup>a</sup> and 51 are openings 56, 56<sup>a</sup> and 57 in the note-sheet, these openings being additional to the ordinary note-sheet openings (not shown) for effecting the operation of the keys of the musical instrument.

When the parts are in normal position the valves are down and air fills the valve-chambers and passages 26 and 26<sup>a</sup>, 27 and 27<sup>a</sup>, chambers 29 and 29<sup>a</sup>, and the bellows connected thereto, the pressure of the air on the diaphragms 31 and 31<sup>a</sup> causing the same to close the adjacent ends of passages 32 and 32<sup>a</sup> and 10 and 10<sup>a</sup>, it being understood that passages 32 and 32<sup>a</sup>, passage 33 connected thereto, and passage 34 and valve chamber 35 are also filled with air. Now when a note-sheet opening 56 comes opposite tracker-bar opening 55, air enters the latter and passes through the connections described to chamber 15 and raises diaphragm 16 and the valve 20 until the latter engages plate 22, this action of the valve opening communication between the exhaust-chamber and valve-chamber 19 and closing communication between the latter and the atmosphere so as to draw the air from the bellows of the loud pedal—for instance—through the connections described (see Fig. 2) into the exhaust-chamber and up through tube 7, this action resulting in the production of an increased volume of sound from the musical instrument. The exhaust-chamber at the same time draws air through the vent-hole 14 from the chamber 15 and the passages and tubes connected therewith, but this action is so restricted that sufficient air is supplied to chamber 15 to maintain valve 20 in its elevated position after the note-sheet in its progress closes tracker-bar opening 55, such air being supplied through the perforation of plate 36 (see Fig. 4) valve chamber 35, passages 34 and 33 and branch passage 32 to inflate the diaphragm 31 (see Fig. 2) to establish communication between said branch

passages and passage 10. The loud tone is sustained until a note-sheet opening 57 registers with the tracker-bar opening 51 when air enters the latter and passes through the connections described (see Fig. 4) and raises diaphragm 43 and valve 41 until the latter closes the perforation of plate 36 and thus cuts off the supply of air through branch passage 32 which holds diaphragm 31 inflated and establishes a suction through said branch passage which permits said diaphragm to close the passage by reason of atmosphere in chamber 29. As a result of this action the air in channel and chamber 15 is vented by the vent 14 and the diaphragm 16, descends lowering valve 20 to its seat 21, this action closing communication between the exhaust-chamber and the loud pedal bellows and opening communication between the latter and the atmosphere through the perforated plate 22 so as to reinflate the bellows and restore the pedal to normal position. Shortly after this action occurs the note-sheet opening 57 passes out of engagement with the tracker-bar opening 51 so as to cut off the supply of air to the under side of diaphragm 43 and immediately thereafter the air below the diaphragm is drawn through the vent-hole through the exhaust-chamber so as to permit the atmospheric pressure on top of the valve 41 to force the latter and the diaphragm down to their original positions. The next action may be a repetition of the operation of the parts to again increase the volume of sound, or the next action may be an operation of the soft pedal to reduce the volume of sound to less than normal,—this being controlled entirely by the note-sheet openings. As shown the opening 56<sup>a</sup> is adapted next to register with tracker-bar opening 55<sup>a</sup> so as to supply atmospheric pressure to the under side of diaphragm 16<sup>a</sup> and thus cut off communication between the atmosphere and the bellows for operating the soft pedals and establish communication between the said bellows and the exhaust-chamber 6 for the purpose of reducing the volume of sound as will be readily understood from the preceding description in connection with the loud pedal, it being understood that the loud and soft pedal connections and mechanism are of duplicate construction and action, and that the soft tone will be continued until the next note-sheet opening 57 registers with tracker-bar opening 51 to effect the restoration of the soft pedal to normal condition, it being noted in this connection that the note-sheet openings 57 and tracker-bar opening 51 are common to both the soft and loud pedal connections because the branch passages 32 and 32<sup>a</sup> are both connected at one end to the passage 33.

From the above description it will be apparent that I have produced an expression device which performs its function efficiently



and reliably and I wish it to be understood that I reserve the right to make such changes as properly fall within the spirit and scope of the appended claims.

5 Having thus described the invention what I claim as new and desire to secure by Letters Patent, is:—

1. An expression device, having an exhaust-chamber, a pair of valve-chambers  
10 connected to the exhaust-chamber and the atmosphere, valves in the valve-chambers normally closing communication between the same and the exhaust-chamber, passages having vent-hole connections with the ex-  
15 haust-chamber and diaphragms to operate said valves, a passage connected to one of the valve-chambers, a diaphragm normally closing the end of said passage opposite to the  
20 closing one end of one of the passages having vent-hole communication with the exhaust-chamber, and a passage connected to the other valve-chamber and in communication with the side of the last-named diaphragm  
52 opposite to the passages normally closed at one end thereby.

2. An expression device, having an exhaust-chamber, a pair of valve-chambers connected to the exhaust-chamber and the  
30 atmosphere, valves in the valve-chambers normally closing communication between the same and the exhaust-chamber, passages having vent-hole connections with the exhaust-chamber and diaphragms to operate  
35 said valves, a passage connected to one of the valve chambers, a diaphragm normally closing the end of said passage opposite to the connected valve-chamber and also normally  
40 closing one end of one of the passages having vent-hole communication with the exhaust-chamber, and a passage connected to the other valve-chamber and in communication with the side of the last-named diaphragm  
45 opposite to the passages normally closed at one end thereby, in combination with a tracker-bar having a pair of openings connected to the passages having vent-hole connection with the exhaust-chamber.

3. An expression device having an exhaust-chamber, a pair of valve-chambers,  
50 connected to the exhaust-chamber and the atmosphere, valves in the valve-chambers normally closing communication between the same and the exhaust-chamber, passages  
55 having vent-hole communications with the exhaust-chamber and diaphragms to operate said valves, a passage connected to one of the valve-chambers, a diaphragm normally-closing the end of said passage opposite to the  
60 connected valve-chamber and also normally closing one end of one of the passages having vent-hole communication with the exhaust-chamber, and a passage connected to the other valve-chamber and in communication

with the side of the last-named diaphragm 65 opposite to the passages normally closed at one end thereby, in combination with a tracker-bar having a pair of openings connected to the passages having vent-hole connections with the exhaust-chamber, and a 70 note-sheet provided with perforations to successively open communication between the atmosphere and the tracker-bar opening connected to the passage having vent hole communication with the exhaust-chamber and 75 closed at one end by the diaphragm and the tracker-bar opening connected to the other passage having vent-hole communication with the exhaust.

4. An expression device having an exhaust-chamber, a pair of valve-chambers connected to the exhaust-chamber and the atmosphere, valves in the valve-chambers normally closing communication between the same and the exhaust-chamber, passages hav- 85 ing vent-hole connections with the exhaust-chamber and diaphragms to operate said valves, a passage connected to one of the valve-chambers, a passage connected to the other valve-chamber, a chamber communi- 90 cating with the last-named passage, a flexible diaphragm in said chamber and bridging and normally closing one end of the first-named passage connected to a valve-chamber and also bridging and normally closing one end of 95 the passage having the diaphragm to operate the valve of the valve-chamber connected to the chamber equipped with the said flexible diaphragm, and a tube communicating with the chamber equipped with the said flexible 100 diaphragm.

5. An expression device, having an exhaust-chamber, a flexible diaphragm at the bottom thereof and a valve-chamber verti- 105 cally above the diaphragm and connected to the exhaust-chamber and the atmosphere, a valve in the valve-chamber normally closing communication between said chamber and the exhaust-chamber and carrying rigidly a stem to be forced upward by the diaphragm 110 at times, a chamber underlying the diaphragm, a passage communicating with said chamber and having a vent-hole connection with the exhaust-chamber, a tube to conduct air at times to said passage, a passage con- 115 nected at one end to the valve-chamber, a chamber communicating with said passage, and a flexible diaphragm closing one side of said chamber and normally closing one end of the passage having a vent-hole connection 120 with the exhaust-chamber.

In testimony whereof I affix my signature, in the presence of two witnesses.

FREDERICH W. WOOD.

Witnesses.

H. C. RODGERS,  
G. Y. THORPE.