

T. DANQUARD & W. J. KEELEY.
 CONTROLLING DEVICE FOR PNEUMATICALLY OPERATED MOTORS,
 APPLICATION FILED NOV. 12, 1910.

993,038.

Patented May 23, 1911.

2 SHEETS—SHEET 1.

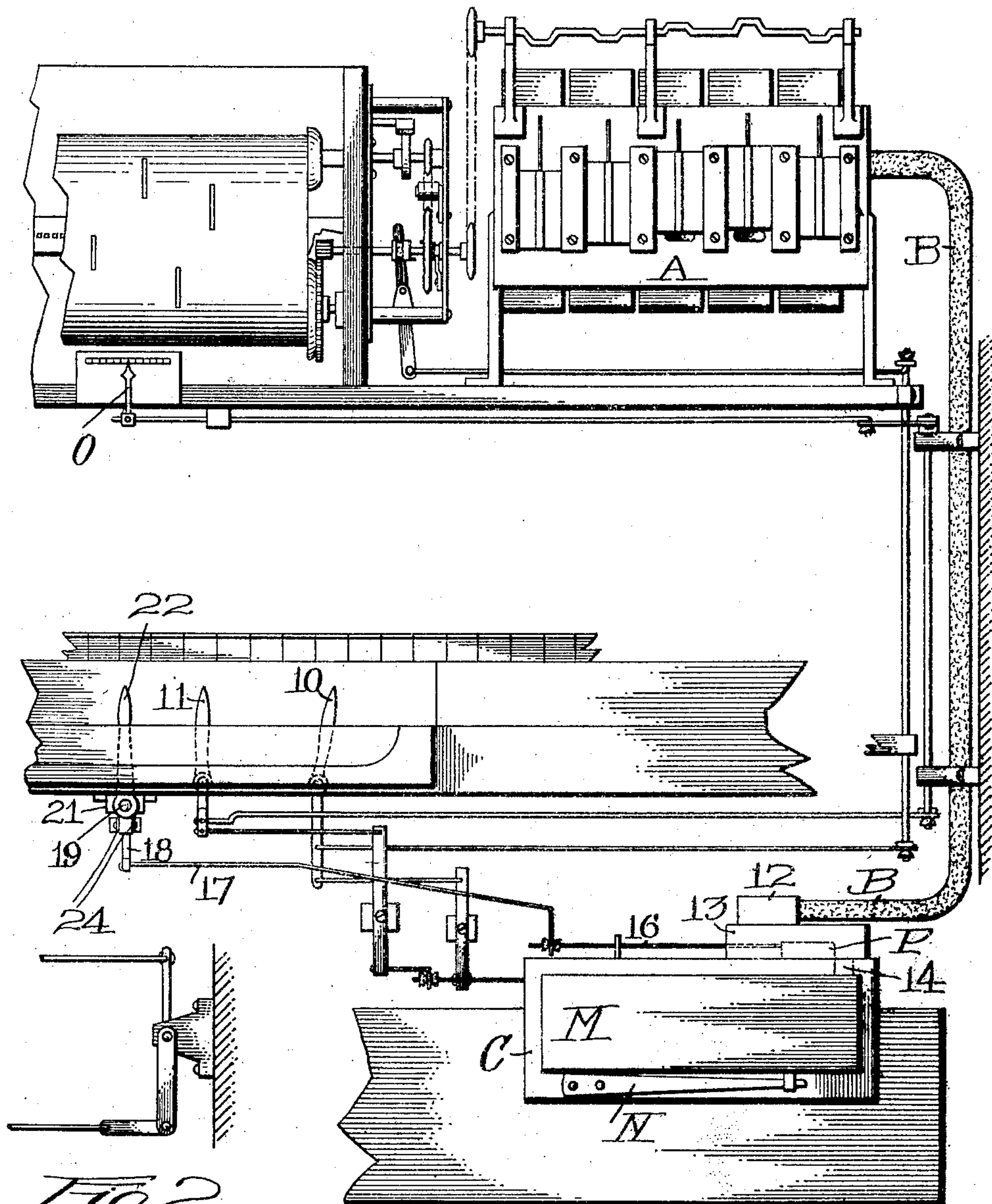


Fig. 2.

Fig. 1.

Witnesses:

C. F. Mason.
 E. M. Allen.

Inventors:
 Thomas Danquard
 William J. Keeley
 By Attorneys
 Sutcliffe & Sutcliffe

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2 SHEETS—SHEET 2.

Fig. 3.

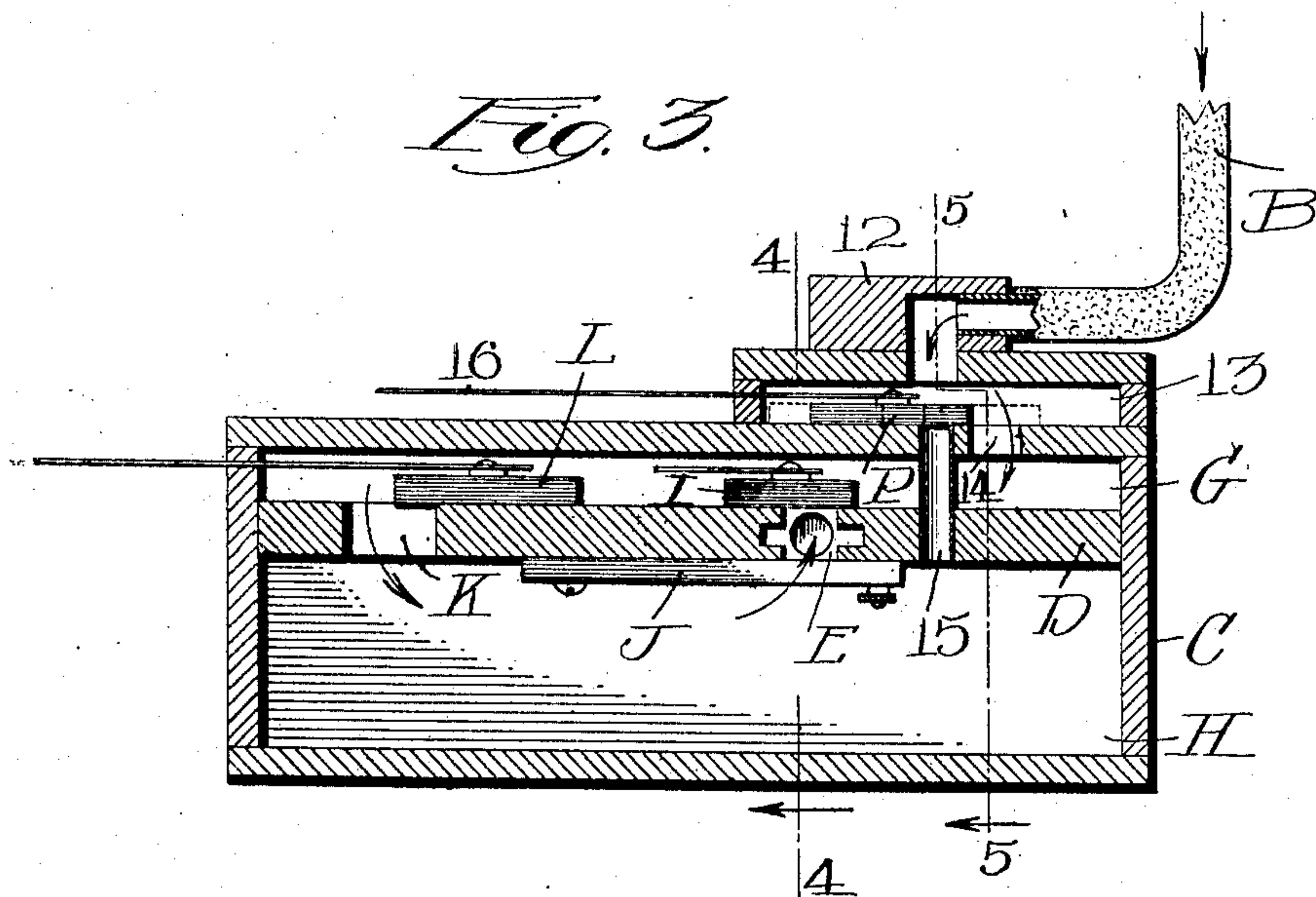


Fig. 4.

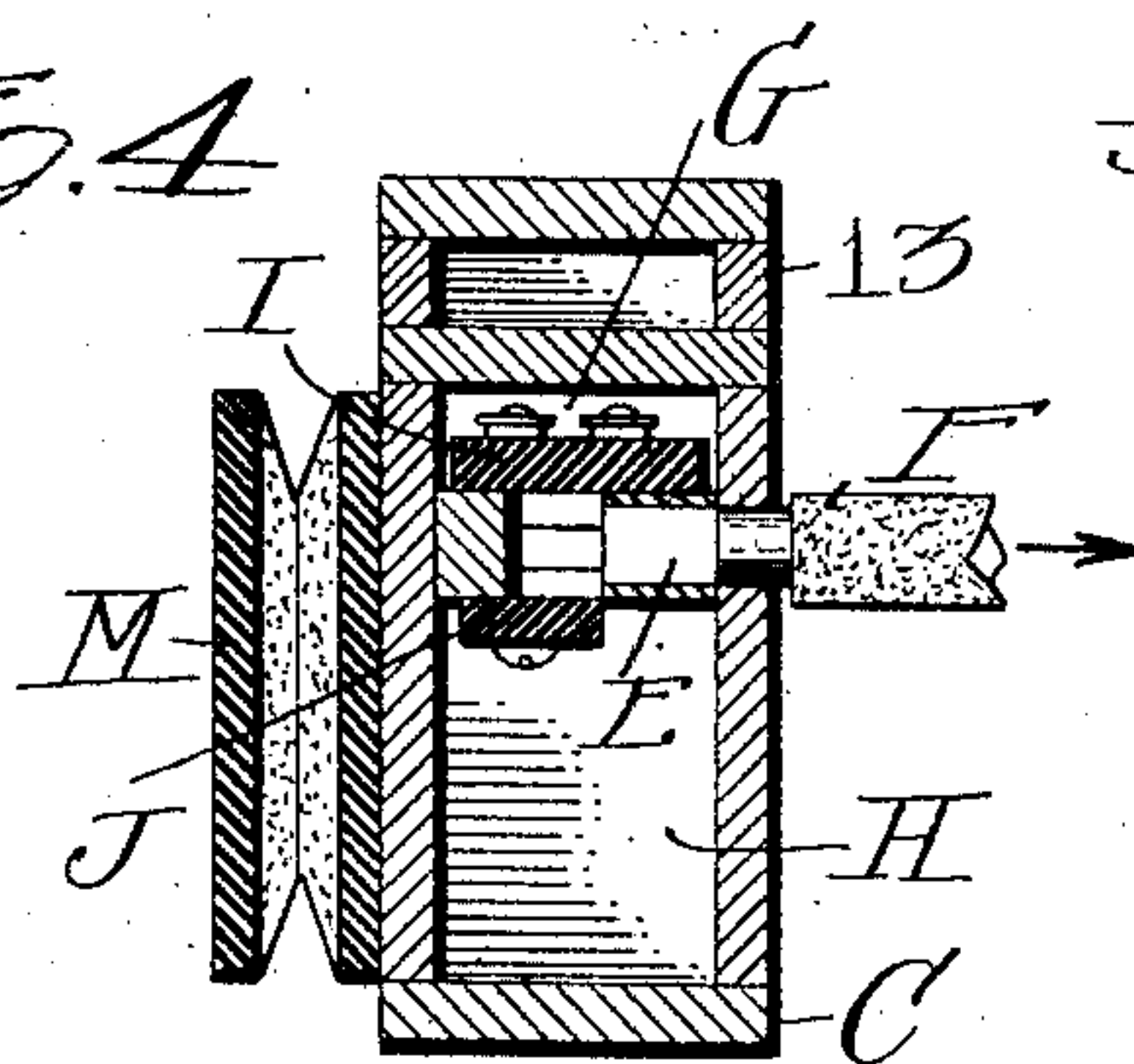


Fig. 5.

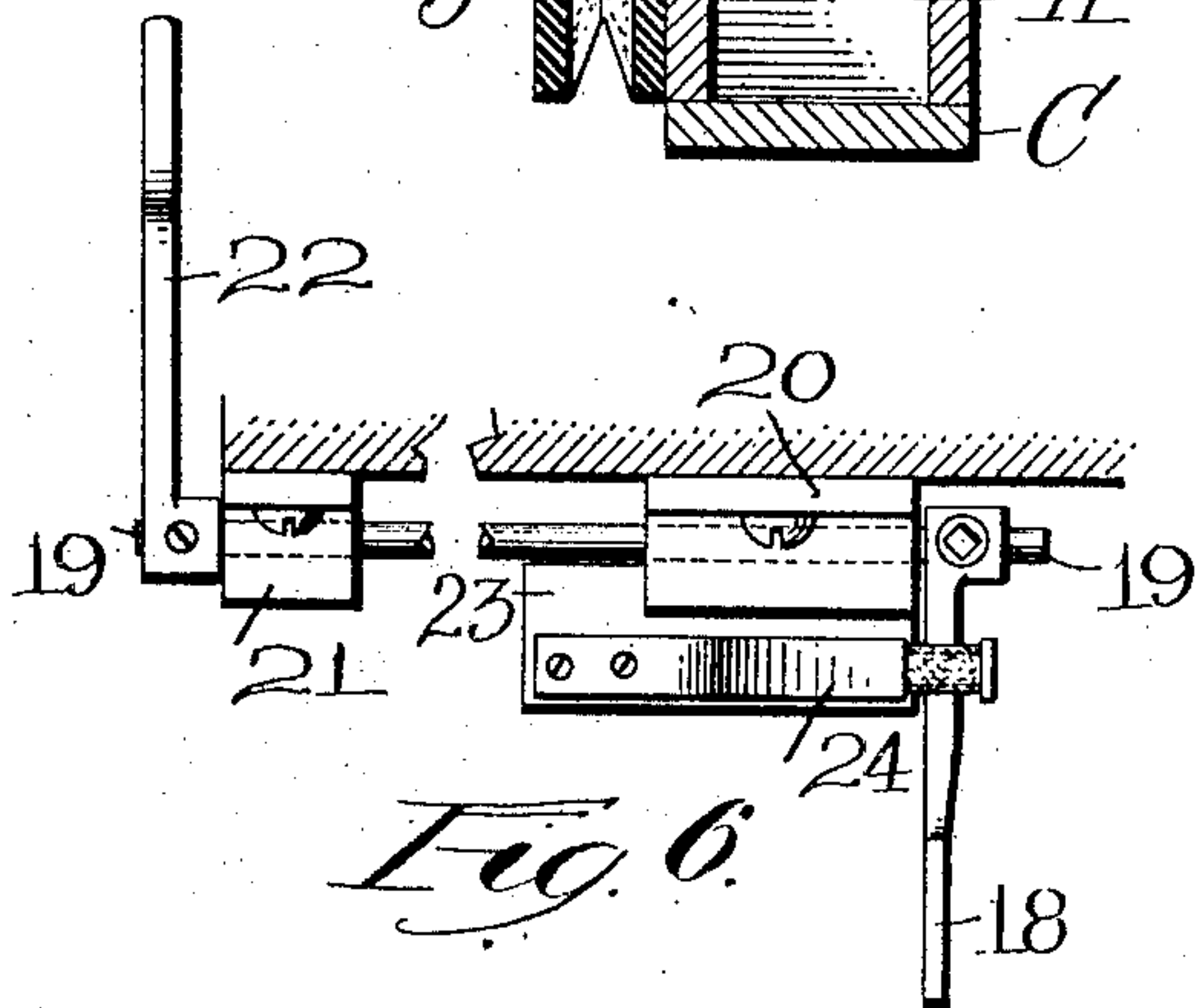
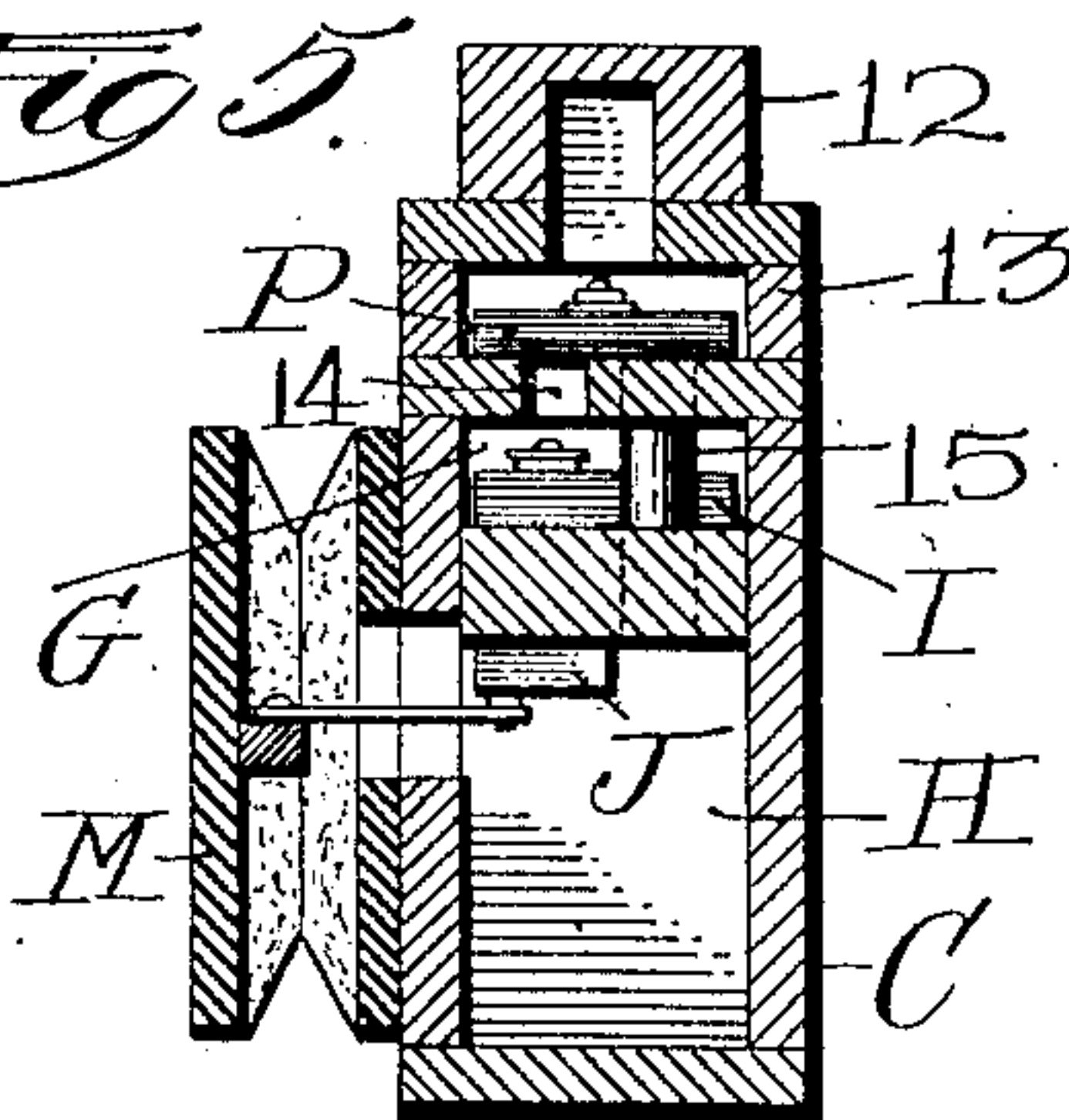


Fig. 6.

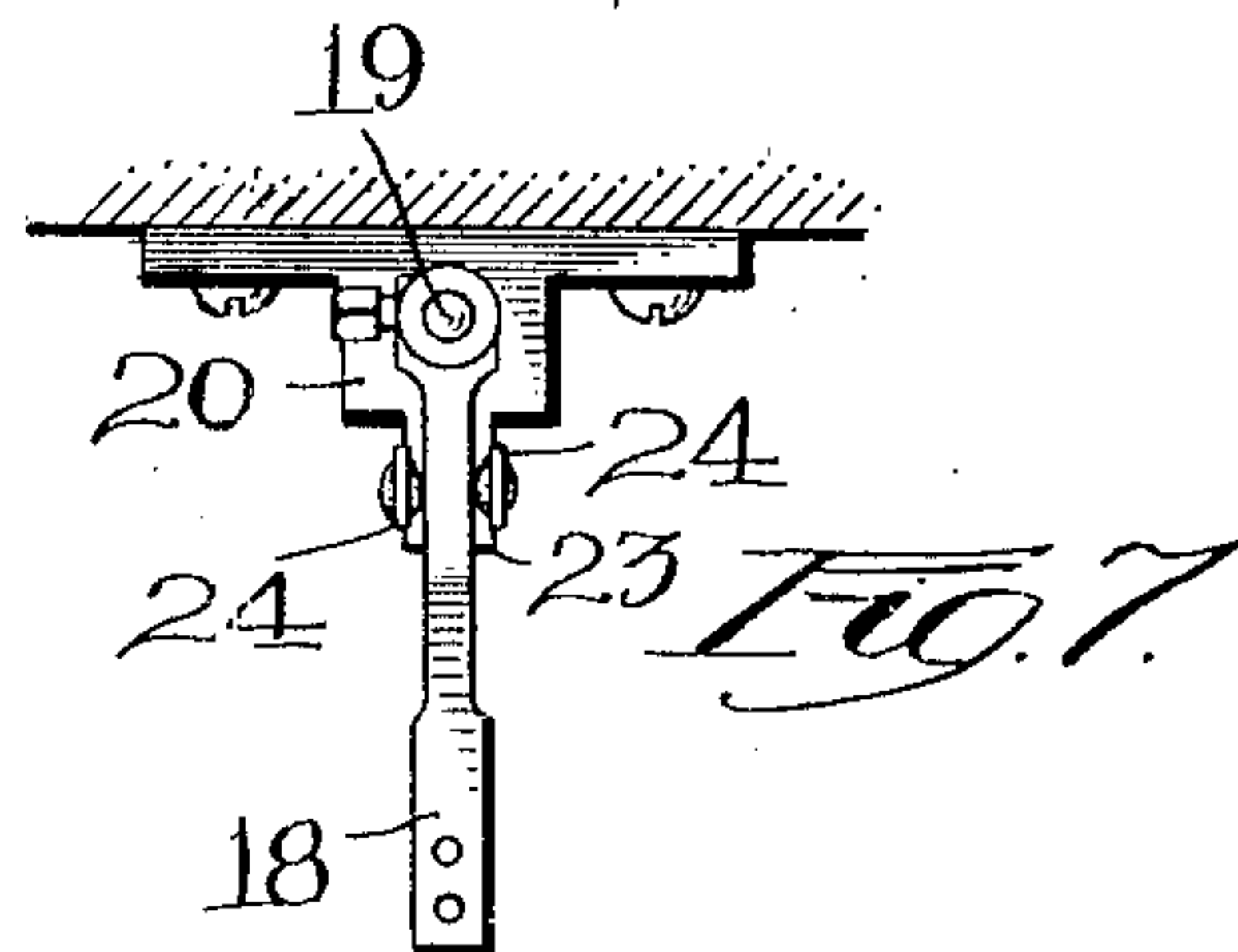


Fig. 7.

Witnesses:

C. F. Mason

E. M. Allen

Inventors:

Thomas Danquard

William J. Keeley

By Attorneys

Smith & Smith

UNITED STATES PATENT OFFICE.

THOMAS DANQUARD AND WILLIAM J. KEELEY, OF NEW YORK, N. Y., ASSIGNORS TO
 AUTO-PNEUMATIC ACTION COMPANY, A CORPORATION OF NEW YORK.

CONTROLLING DEVICE FOR PNEUMATICALLY OPERATED MOTORS.

993,038.

Specification of Letters Patent.

Patented May 23, 1911.

Application filed November 12, 1910. Serial No. 592,070.

To all whom it may concern:

Be it known that we, THOMAS DANQUARD and WILLIAM J. KEELEY, citizens of the United States, both residing at New York, in the county of New York and State of New York, have invented a new and useful Controlling Device for Pneumatically-Operated Motors, of which the following is a specification:

The object of this invention is to provide a new and improved controlling device for pneumatically operated motors of that class which are especially designed to draw the note sheet over the tracker bar of an automatic musical instrument.

To this end the invention consists of the parts and combinations of parts hereinafter more particularly described and claimed.

A preferred embodiment of the invention is shown in the accompanying two sheets of drawings, referring to which,

Figure 1 is a front elevation of enough of the parts to illustrate the invention. Fig. 2 is a plan view of the connections from the tempo and re-roll levers. Fig. 3 is a central sectional elevation through the valve box. Fig. 4 is a cross-sectional elevation on the line 4-4 of Fig. 3. Fig. 5 is a cross sectional elevation on the line 5-5 of Fig. 3. Fig. 6 is a side elevation partly broken away of the auxiliary tempo valve operating means, and Fig. 7 is a rear view of the parts shown in Fig. 6.

The invention will be best understood by considering a detailed description of the mechanism shown in the drawings.

Referring to the drawings and in detail, A designates a pneumatically operated motor which is connected by gearing in the ordinary manner to draw the note sheet over the tracker of a musical instrument. This connection consists of mechanism, such as a pinion and gear, arranged so that the note sheet will be drawn slowly forward over the tracker when the instrument is to be played; and of a clutch and additional gearing arranged so that the pinion will be disconnected from its gear and the clutch engaged and the note sheet drawn rapidly over the tracker in a reverse direction when the note sheet is to be re-rolled.

Extending from the motor is a pipe B which is connected to a valve box C. The valve box is provided with a partition D in which is arranged a passage E connected to

which is a pipe F which extends to the exhaust bellows or pumping apparatus. It will be noted that the partition D divides the valve box into an upper compartment G and a lower compartment H. The passage E has an opening communicating with the upper compartment, which opening is controlled by a re-roll valve I, and an opening communicating with the lower compartment H which is controlled by a governing valve J. The partition D has a passage K called the main port formed through the same, which passage is controlled by a tempo valve L. The governing valve J is pivoted to the partition D, as shown. A regulator pneumatic M is arranged on the side of the valve box and communicates to the lower compartment H by a passage cut in the side of the valve box, and the movable leaf of the regulator pneumatic is connected by a suitable link to the governing valve, as shown in Fig. 5. A spring N presses outwardly on the regulator pneumatic and tends normally to tension the regulator pneumatic to move the governing valve J to uncover the passage which it controls.

A re-roll controlling lever 10 is mounted in the frame of the instrument and is connected by shafts, levers, and links to control the position of the re-roll valve I and the position of the driving pinion and clutch between the motor and the rolls which carry the music sheet. A tempo lever 11 is mounted in the frame of the instrument and is connected by shafts, levers, and links to control the tempo valve L and also to operate an indicator O.

All the parts previously described are of the ordinary construction and their operation is well understood and is substantially as follows:—The parts are shown in their normal position for the note sheet to be drawn forward for playing over the tracker, the top of the re-roll lever 10 being thrown to the right so that the re-roll valve I covers its passage and so that the pinion is meshed with the gear on the take-up roll or spool on which the note sheet is to be wound. The tempo valve L is set by the tempo lever 11 to uncover the passage K to the desired extent to get the desired speed of the motor. The function of the regulator pneumatic M and governing valve J is to keep the exhaust or vacuum in the lower compartment H at a normal or fixed degree, depending upon

the pressure or tension of the spring N on the regulator pneumatic, so that the motor will be operated evenly and smoothly at the speed determined by the varying adjustments of the tempo valve L with relation to the passage K; and so that any intermitting or pulsating action from the exhausting bellows will not affect the smooth operation of the pneumatic motor. For example, if the tempo valve L should be moved to the right to uncover more of the passage K to cause the motor to run faster, the increase of pressure in the lower compartment H will instantly act on the regulator pneumatic M to cause the movable member of the same to open the governing valve J wider to meet the new condition and thus to maintain the vacuum in the lower compartment at the degree determined by the spring N so that the increased speed of the motor will be even and smooth and will be determined by the increased opening of the passage K. On the other hand, if the tempo valve L should be moved to the left to cover more of the passage K, the decrease of pressure in the lower compartment H will let the fixed tension of the spring N act on the movable leaf of the regulator pneumatic to move the same outwardly to close the governing valve J, so that the pressure determined by the tension of the spring will be maintained in the lower compartment G, and so that the motor will run at the adjusted slower speed, smoothly, depending upon the restricting adjustment of the tempo valve L. Correspondingly, an increase of the exhaust from the exhausting bellows will act through the pipe F and cause the regulator pneumatic to close the governing valve J partially, while a decrease of the exhaust from the exhausting bellows will allow the spring N to pull out on the movable leaf of the regulator pneumatic and thus open the governing valve J wider. Thus, by keeping the exhaust in the lower compartment determined by the tension of the spring N, the motor will be run evenly and smoothly at any speed obtained by any adjustment of the tempo valve L relatively to the passage K. The tension of the spring N is fixed when the parts are originally assembled and adjusted and once fixed is never disturbed. By normal tension, we mean that the spring will assume a certain position in respect to a certain pull thereon by the movable leaf of the pneumatic M or in other words that the pull of the spring on the pneumatic M is always the same for any given position of said pneumatic M. By this arrangement the spring N, pneumatic M and governing valve J perform only the function of keeping the motor at the speed called for by the adjustment of the valve L, the valve P, or both valves in combination, and have nothing to do with any adjustment of the speed of the motor.

When the top of the re-roll lever 10 is thrown to the left, the pinion is disconnected from the gear on the take-up roll or spool and the motor is connected through the clutch to operate the music spool; and at the same time, the re-roll valve I is moved to uncover the opening into the passage E so that the exhaust from the exhaust bellows will be connected directly to the passage B without passing through the compartment H, whereby the music sheet can be re-rolled rapidly. This action can take place, although the governing valve does not then work, because the pulsating and intermitting action obtained is immaterial, as the instrument is not being played. The parts before described are arranged in the ordinary way.

The object of the present invention is to provide an auxiliary means so that the motor can be run faster or slower and still under the control of the spring tensioned regulator pneumatic and governing valve to draw the note sheet forward for playing without varying the regulator pneumatic above or below its normal tension. To accomplish this purpose, an auxiliary tempo valve mechanism is provided which is arranged independently of the governing valve for increasing or diminishing the flow between the motor and exhausting bellows without interfering with the regular or normal operation of the spring tensioned regulator pneumatic and governing valve. By this arrangement, the motor can be run faster or slower, but always under the control of the normal spring tension of the regulator pneumatic. The way this additional mechanism is arranged is as follows:—The passage or pipe B from the motor to the valve box is connected to a block or coupling 12 arranged on top of an auxiliary or supplemental valve box 13. A passage 14 called the auxiliary port is cut in the top of the valve box C so as to allow communication between the upper compartment G and the auxiliary valve box 13. A pipe 15 extends through the top of the valve box C and down through the partition D so as to afford a communication between the auxiliary valve box 13 and the lower compartment H. This pipe thus forms a direct passage from the motor to the governing valve, independent of the tempo valve. An auxiliary valve P is arranged in the auxiliary valve box 13 so as to control the opening or passage 14 and the mouth of the pipe 15. Connected to the auxiliary valve is a wire or rod 16 which is adjustably connected to another rod 17, which latter is connected to an arm or lever 18 mounted on the rear end of a shaft 19 journaled in bearings 20 and 21 secured to the frame of the instrument. A lever 22 is secured on the front end of the shaft 19 in convenient position to the levers 10 and 11 and this lever 22

forms the operating handle for the auxiliary valve P. Extending down from the bearing 20 is a block 23 secured to the sides of which are tension springs 24—24, the ends of which extend beyond the rear end of the block 23 and engage the arm 18 upon opposite sides thereof, pieces of felt or soft packing being wound around the ends of the springs and bearing on the rear edges of the block 23 when the arm 18 is in central position to cause a noiseless operation of the parts. The springs thus will act to keep the arm 18 centered or normally in the position shown in Fig. 7. If the lever 22 should be operated to swing the lower end of the arm 18 to the right, as shown in Fig. 7, the right hand spring 24 will be put under tension and, when the lever 22 is released, will force or throw the arm 18 back to normal position. The left hand spring 24 will also act in the same way when the arm 18 is moved to the left. Thus the arm 18, the lever 22 and the auxiliary valve P are kept normally in an intermediate position.

The normal position of the auxiliary valve is shown in Fig. 3. In this normal position the auxiliary valve completely covers the end of the pipe 15 and does not cover the passage 14. Hence all the air coming down through the passage B will go through the passage 14 and the speed of the motor will be controlled by the adjustment of the tempo valve L. Suppose now that the top of the lever 22 should be moved to the right. This will move the auxiliary valve P to the left and will more or less uncover the top of the pipe 15, depending upon the extent of the movement of the lever 22. In this position of the parts, part of the air coming down through the passage B will flow through the pipe 15 and thus the communication between the passage B and the lower compartment H will be increased in size and the motor will be speeded up in operation just as if the tempo valve L were moved to the right to uncover the passage K to a greater extent, and with the important point that the motor will still remain under the normal or regular controlling action of the spring controlled regulator pneumatic M and the governing valve J; in other words, this operation does not in any way affect the normal operation of the regulator pneumatic M and governing valve J or the normal tension of the controlling spring N. On the other hand, if the top of the lever 22 should be moved to the left, the auxiliary valve P will be moved to the right, as shown in Fig. 3, which will restrict the flow from the passage B into the valve box C and thus into the lower compartment H, while at the same time leaving the regulator pneumatic M and the governing valve J free to operate in their normal or regular way and without in any way affecting the normal pres-

sure or tension of the spring N on the regulator pneumatic. Thus, under all conditions of adjustment of the levers 10 and 22, when the note sheet is drawn forward or the instrument played, the speed of the motor is always under the control of the spring controlled regulator pneumatic and governing valve and the normal tension of the spring is not varied, and the motor speed is determined merely by the throttling adjustment obtained by the tempo valve L or by the adjustment of the tempo valve L combined with the adjustment of the auxiliary valve P. Thus under all playing conditions, the speed of the motor is a speed governed by the normal tension of the regulator pneumatic, although it may be instantly set to be faster or slower. By this arrangement, the intermitting or pulsating action from the exhaust bellows can never reach the motor when the same is acting to draw the music sheet forward for playing. When the lever 22 is released, it returns automatically by the action of the spring construction previously described, to the position shown in the drawings, so that the auxiliary valve is brought back to normal position.

The auxiliary valve mechanism and controlling means does not interfere in any way with the operation of the tempo valve and lever and the operator can control the motor from either lever, the speed always being under the governing action of the normal tension of the regulator pneumatic.

The details and arrangements herein described may be greatly modified by a skilled mechanic without departing from the scope of the invention as expressed in the claims.

Having thus fully described our invention, what we claim and desire to secure by Letters-Patent is:—

1. A driving mechanism for the note sheet of a musical instrument, comprising a pneumatically operated motor, a regulator pneumatic and governing valve therefor, a spring for tensioning the regulator pneumatic, a tempo valve arranged to throttle the flow from the motor, and an auxiliary tempo valve mechanism independent of said governing valve for increasing or diminishing the flow from the motor without affecting the normal tension on the regulator pneumatic.
2. A driving mechanism for the note sheet of a musical instrument, comprising a pneumatically operated motor, a spring tensioned regulator pneumatic, a governing valve therefor, a tempo valve arranged to throttle the flow from the motor, and an auxiliary tempo valve mechanism arranged between the motor and governing valve to increase or diminish the flow from the motor without affecting the normal tension on the regulator pneumatic.
3. A driving mechanism for the note sheet

of a musical instrument, comprising a pneumatically operated motor, a spring tensioned regulator pneumatic, a governing valve therefor, a tempo valve arranged to control the flow from the motor, a direct passage from the motor to the governing valve, and an auxiliary valve for controlling the flow from the motor to the controlling valve through the passage controlled by the tempo valve and the flow through said direct passage.

4. A driving mechanism for the note sheet of a musical instrument, comprising a pneumatically operated motor, two compartments, a bellows or exhaust connection from one of the compartments, a spring tensioned regulator pneumatic and governing valve for governing the tension in said compartment, a passage connecting the two compartments, a tempo valve controlling the same, a passage from the motor into the compartment containing the tempo valve, and a direct passage from the motor into the compartment containing the governing valve, and auxiliary valve mechanism for controlling these passages.

5. A driving mechanism for the note sheet of a musical instrument, comprising a pneumatically operated motor, a valve box divided into two compartments, a passage connecting the two compartments, a tempo valve in one of the compartments controlling said passage, a connection from the other compartment to the exhaust, a spring tensioned regulator pneumatic and a governing valve for regulating the tension in this compartment, a supplemental valve box, a connection from the motor to the supplemental valve box, a passage from the supplemental valve box into the compartment containing the tempo valve and a direct passage from the supplemental valve box into the compartment containing the governing valve, and an auxiliary valve controlling said passages.

6. A driving mechanism for the note sheet of a musical instrument, comprising a pneumatically operated motor, a valve box divided into two compartments, a passage connecting the two compartments, a tempo valve in one of the compartments controlling said passage, a connection from the other compartment to the exhaust, a spring tensioned regulator pneumatic and a governing valve for regulating the pressure in this compartment, a supplemental valve box, a connection from the supplemental valve box into the compartment containing the tempo valve, a direct passage from the supplemental valve box into the compartment containing the governing valve, an auxiliary valve controlling said passages, and means for normally holding the auxiliary valve to open the passage into the compartment containing the tempo valve and to close the direct passage.

7. A driving mechanism for the note sheet

of a musical instrument, comprising a pneumatically operated motor, a spring tensioned regulator pneumatic and governing valve therefor, a tempo valve arranged to throttle the flow from the motor, an auxiliary tempo valve mechanism for increasing or diminishing the flow from the motor without affecting the normal tension on the regulator pneumatic, and means for holding the auxiliary tempo valve mechanism normally in an intermediate position.

8. A driving mechanism for the note sheet of a musical instrument, comprising a pneumatically operated motor, a spring tensioned regulator pneumatic and governing valve therefor, a tempo valve arranged to throttle the flow from the motor, an auxiliary tempo valve mechanism for increasing or diminishing the flow from the motor without affecting the normal tension on the regulator pneumatic, an operating lever and connections therefrom to the auxiliary tempo valve mechanism, and means for holding the auxiliary tempo valve mechanism and controlling lever normally in an intermediate position.

9. A driving mechanism for the note sheet of a musical instrument, comprising a pneumatically operated motor, two compartments, a bellows or exhaust connection from one of the compartments, a spring tensioned regulator pneumatic and governing valve for governing the tension in said compartment, a passage connecting the two compartments, a tempo valve controlling the same, a passage from the motor into the compartment containing the tempo valve, a direct passage from the motor into the compartment containing the governing valve, an auxiliary valve mechanism for controlling these passages, and means for maintaining the auxiliary valve normally in position to uncover the passage to the compartment containing the tempo valve and to cover the direct passage.

10. A driving mechanism for the note sheet of a musical instrument, comprising a pneumatically operated motor, a main port and main tempo valve arranged to control the flow from the motor, a direct passage from the motor arranged independently of said main port, and an auxiliary valve and port for controlling the flow from the motor through the main port, said auxiliary valve being also arranged to control the flow through said direct passage.

11. A driving mechanism for the note sheet of a musical instrument, comprising a pneumatically operated motor, a main port and main tempo valve arranged to control the flow from the motor, a direct passage from the motor arranged independently of said main port, an auxiliary valve and port for controlling the flow from the motor through the main port, said auxiliary valve

being also arranged to control the flow through said direct passage, and means for normally keeping said auxiliary valve in position to close said direct passage and open
5 said auxiliary port.

12. A main driving mechanism for the note sheet of a musical instrument, comprising a pneumatically operated motor, a main port and main tempo valve arranged to control the flow from the motor, a direct passage from the motor arranged independently of said main port, an auxiliary valve and port for controlling the flow from the motor through the main port, said auxiliary valve being
10 also arranged to control the flow through said direct passage, a lever and connections

for adjusting the auxiliary tempo valve independently of the main tempo valve, and a block carrying two opposed springs which bear against the block and engage the lever
20 between their ends so as to hold the auxiliary tempo valve and lever normally in an intermediate position.

In testimony whereof we have hereunto set our hands, in the presence of two subscribing witnesses.

THOMAS DANQUARD.
WM. J. KEELEY.

Witnesses:

WM. J. BARTON,
HERBERT SIMPSON.