M. CLARK.

GOVERNOR FOR AIR MOTORS.

APPLICATION FILED SEPT. 12, 1917.

1,298,291. Patented Mar. 25, 1919.

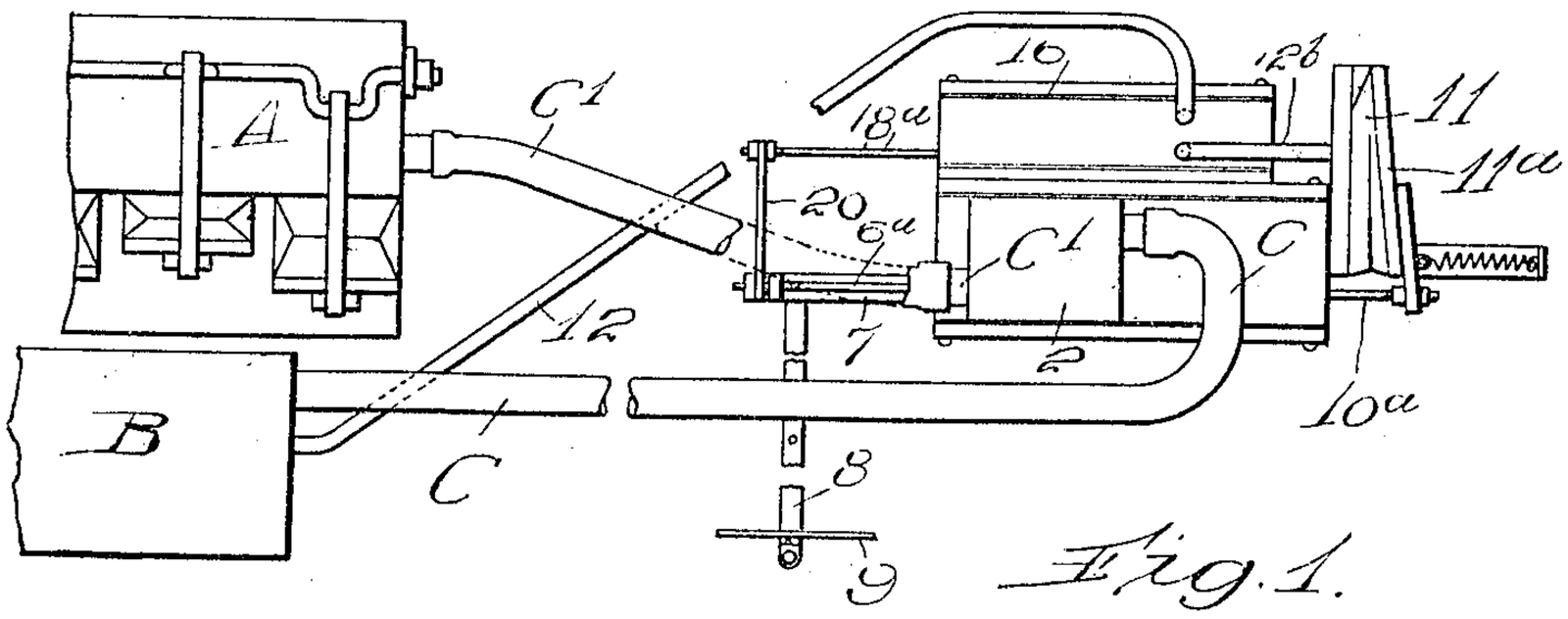
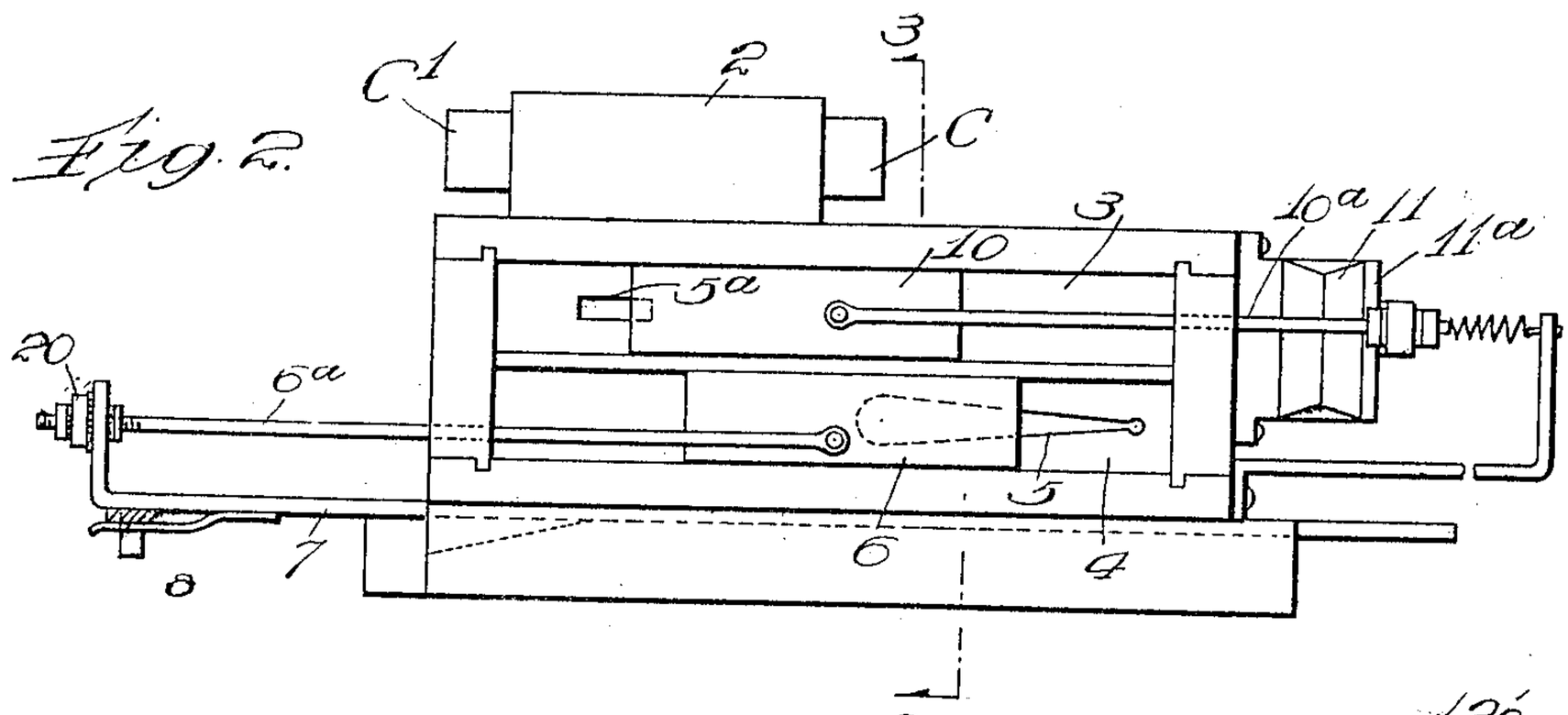
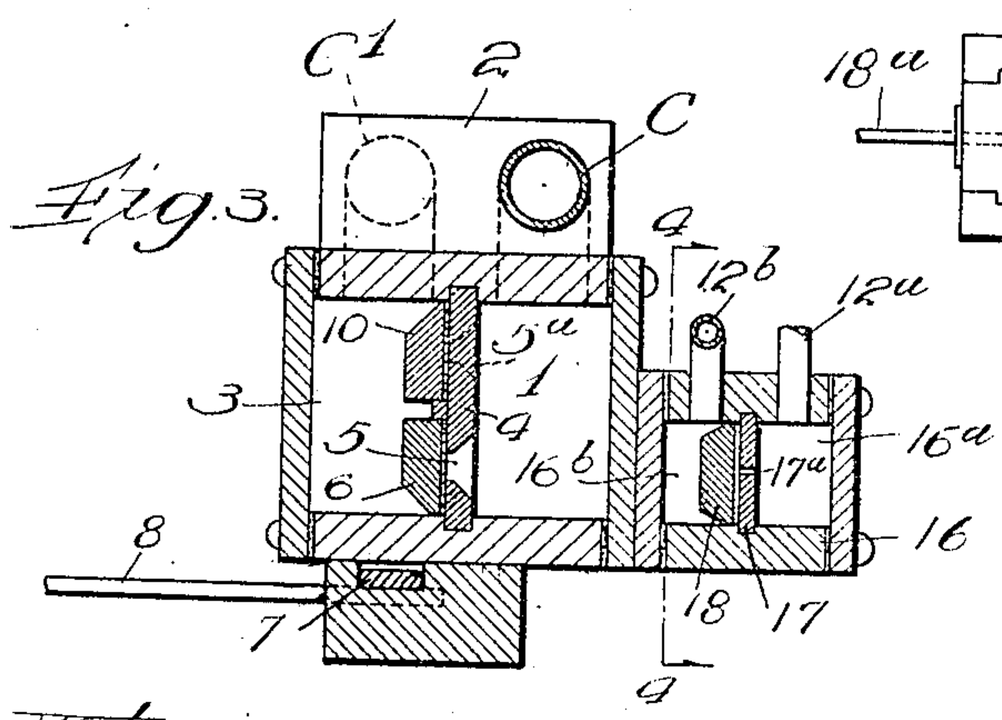


Fig. 1.

Fig. 2.





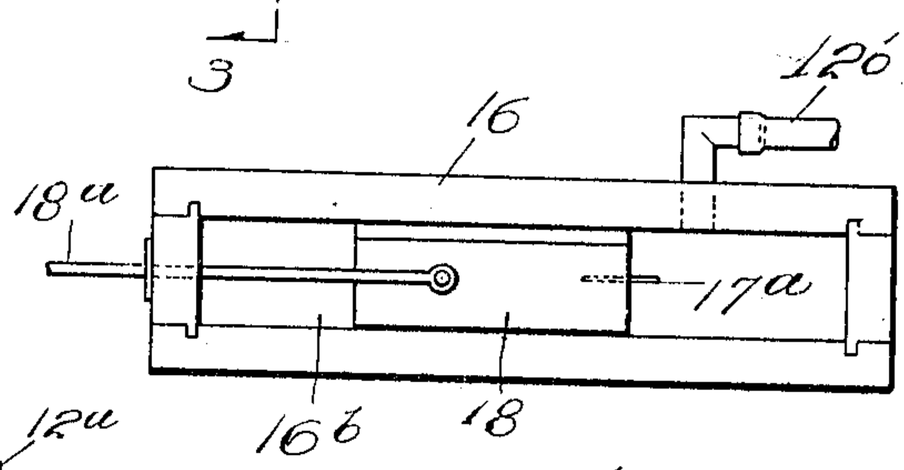


Fig. 4.

Witness:

Inventor:
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by Burton & Burton
his Attys.

UNITED STATES PATENT OFFICE.

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GOVERNOR FOR AIR-MOTORS.

1,298,291. Specification of Letters Patent. Patented Mar. 25, 1919.

Application filed September 12, 1917. Serial No. 190,903.

To all whom it may concern:

Be it known that I, MELVILLE CLARK, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented new and useful Improvements in Governors for Air-Motors, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

The purpose of this invention is to provide an improved governor for an air motor particularly designed for such motors when employed for actuating the note-sheet driving mechanism of an automatic piano player. It consists in the elements and features of construction shown and described as indicated by the claims.

In the drawings:—

Figure 1 is a plan view showing a portion of an air motor equipped with the governing devices embodying this invention.

Fig. 2 is a front elevation with the front plate of the valve chamber removed.

Fig. 3 is a section at the line 3—3 on Fig. 2.

Fig. 4 is a section at the line 4—4 on Fig. 3, extending through the exhaust controlling valve box only.

In the structure shown in the drawings, A is a conventional representation of an air motor of familiar form; B represents conventionally the exhaust devices for operating the air motor, and C is an air pipe connection of the exhaust devices to the motor, connection being made by way of the governing devices hereinafter explained. 1 is a chamber with which the pipe, C, is connected through the block, 2, mounted on said chamber. 3 is a chamber partitioned from the chamber, 1, by the partition, 4, which has a port, 5, controlled by the valve, 6, which is the usual tempo valve having its stem extending out through the end of the chamber and connected with an actuator, 7, which is in turn connected with the tempo lever, 8, which moves over a graduated scale, 9, for regulating and indicating the speed of playing. The chamber, 3, is connected with the motor by a pipe, C^1, said connection of the pipe, C^1, with the chamber, 3, being made through the block, 2. Besides the communication which the chamber, 1, has with the chamber, 2, by way of the valved port, 5, it has a second communication through the partition, 4, by means of a narrow slit forming a port, 5^a, which is controlled by a valve, 10, sliding in said partition in said chamber, 3, and having its stem, 10^a, extending out through the opposite end of said chamber from that through which the stem of the valve, 6, extends. Said stem, 10^a, is connected outside said member with the moving wall, 11^a, of the pneumatic, 11, mounted on the end of the chamber and connected by the tube, 12, with the exhaust devices.

The construction thus far described comprises beside what may be termed the direct connection between the exhaust devices and the motor consisting of the chambers, 1 and 3, communicating through the port, 5, controlled by the valve, 6, a second connection which may be called a "by-pass," consisting of the communication between the chambers, 1 and 3, which is controlled by the valve, 10. The first mentioned or main connection is directly regulated by the tempo lever operating the valve, 6, in accordance with the speed of playing desired. But with any given adjustment of the tempo valve, uncovering the port, 5, to any given extent, the speed of operation of the motor and subsequent speed of playing will vary with the degree of exhaust tension existing in the exhaust devices and operating through the connection controlled by the tempo valve upon the motor. In the absence of means to prevent such results, this would result in a speed of operation of the motor and consequent speed of playing, varying with the varying exhaust tension produced by the exhaust devices which as is well understood, is varied by the pumping according to the loudness of playing desired. To prevent variation of the speed accompanying the variation of loudness, the by-pass controlling valve, 10, is operated by the pneumatic, 11, connected with the exhaust devices, so as to be collapsed more or less according as the exhaust tension is more or less, and by its collapse to close the valve, 10, more or less. The motor is thus operated by two distinct quantities, so to speak, of exhaust, one of which, that controlled by the valve 10, is diminished as the exhaust tension increases, while the other is subject to the control of the tempo lever. By properly proportioning the areas of the two ports controlled by the two valves, 6 and 10, respectively, the speed of the motor for any given adjustment of the tempo valve 6, may be rendered measurably constant

throughout considerable variations of the exhaust tension.

For more completely efficient regulation, however, an additional expedient is employed, consisting in governing the communication of the exhaust with the pneumatic, 11, in relation to the adjustment of the tempo lever and valve, 6. This is effected by providing a valve control in the passage which connects the pneumatic, 11, with the exhaust devices, and for this purpose there is mounted upon the casing having the chambers, 1 and 3, a valve box, 16, partitioned into two chambers, 16^a and 16^b, with one of which the duct, 12^a, leading from the exhaust devices is connected, while the other has the duct, 12^b, leading to the pneumatic, 11. The partition, 17, between the two chambers has a narrow slit constituting a port, 17^a, which is controlled by a sliding valve, 18, in the chamber, 16^b, said valve having its stem, 18^a, extending out through the end of the chamber for direct operation by the tempo valve slide bar by means of a rigid cross connection, 20. When the tempo lever is operated for opening the tempo valve, at a certain point in its operation,—that is, when it has reached adjustment for a certain speed, the further movement of the tempo valve in direction for opening to increase the speed moves the valve, 18, over the port, 17^a, uncovering the same to a greater or less extent according to the continued movement in the opening direction of the tempo valve, and thereby increases the communication of the exhaust devices with the pneumatic, 11, and the degree of collapse of said pneumatic which will be produced by any given said tension then existing in the exhaust devices. Such collapse operates, as already explained, to close the valve, 10, diminishing the communication of the exhaust devices with the motor.

The several devices described coöperating, give the result, that, at any adjustment of the tempo valve, the communication of the exhaust devices with the motor is diminished as the exhaust tension increases, and that the effect of the exhaust tension to thus decrease the communication with the motor is increased as the tempo valve is opened wider.

I claim:—

1. In combination with an air motor and exhaust devices by which it is operated, air connections from the exhaust devices to the motor comprising a main passage, a by-pass, a valve in the main passage and tempo controlling devices for operating that valve; a pneumatically operated valve in the by-pass having air connections from the exhaust devices for operating said pneumatically-operated valve in one direction and yielding means resisting its actuation in that direction, and means controlled by the tempo-controlling devices for controlling said last mentioned air connection with the exhaust devices.

2. In combination with an air motor and exhaust devices by which it is operated, air connections from the exhaust devices to the motor comprising a main passage and by-pass, a valve in the main passage and tempo-controlling devices for operating that valve, a pneumatically-actuated valve in the by-pass connection; air connections from the exhaust devices for actuating said last mentioned valve independent of the valve control in the air connection from the exhaust devices to the motor.

3. In a structure such as defined in claim 1, the means of controlling the exhaust connection with the pneumatic valve-actuating devices, comprising a partitioned chamber in the air conduit which connects said pneumatic devices with the exhaust devices, the partition having a narrow and elongated slot; a valve mounted for sliding longitudinally over said slot, having mechanical operating connections from the tempo valve operating means to said slot-controlling valve.

In testimony whereof, I have hereunto set my hand at Chicago, Illinois, this 7th day of September, 1917.

MELVILLE CLARK.