

UNITED STATES PATENT OFFICE.

EMIL SWANSON, OF STEGER, ILLINOIS, ASSIGNOR TO STEGER & SONS PIANO MANUFACTURING COMPANY, OF STEGER, ILLINOIS, A CORPORATION OF ILLINOIS.

PNEUMATIC ACTION FOR AUTOMATIC PLAYING MECHANISM.

1,065,634.

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To all whom it may concern:

Be it known that I, EMIL SWANSON, a citizen of the United States, residing at Steger, in the county of Will and State of Illinois, have invented new and useful Improvements in Pneumatic Actions for Automatic Playing Mechanism, 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 construction of the pneumatic action of an automatic playing mechanism or keyed instrument.

It consists in the elements and features of construction shown and described, as indicated in the claims.

In the drawings: Figure 1 is a vertical fore-and-aft section of a pneumatic action embodying this invention, the same being shown in connection with the hammer action of a piano. Fig. 2 is a detail section of one power unit of the pneumatic action on a larger scale than Fig. 1. Fig. 3 is a detail on a large scale of the primary pneumatic valve.

The drawings represent the tracker, 1, in its usual relation to the music roll, 2, and take-up roll, 3, which are indicated by outline only. From the tracker the air ducts in the form of flexible tubes, 4, extend to the primary pneumatics, 5, of the usual diaphragm type which operate valves, 6,—7, controlling the flushing tubes, 8, leading to the secondary pneumatics, 9, which in turn operate the valves, 10, for controlling the communication of the power pneumatics, 11, alternately with the exhaust chamber, 12, and with the outer atmosphere through the passage, 32, and inlet port, 14. Each power pneumatic is connected by a rod, 15, with the lever, 16, which acts upon the piano hammer action through the medium of the lever, 17, connected with the abstract, 18, for actuating the wippen, 19; said lever, 17, being the customary lower abstract link extended forwardly from its connection with the abstract to afford the lever arm upon which the lever, 16, operates. In this construction the following detail features are to be noted as characteristic of the structure: The primary pneumatic valves, 6,—7, are both screwed into a stem, 6^a, which is in the form of a screw-eye,—that is, having a head, 7^a, in the form of an eye, rendering it cheap

in construction and facilitating manipulation in assembling parts while affording a smooth round head for bearing upon the diaphragm pneumatic, 5. The entire valve structure is made up by screwing onto the threaded stem, 6^a, first the lower valve, 7, which has a leather seating face, 7^b, followed by the spacing collar, 7^c, which has a flat end for bearing against the leather face of the valve, 7. This is followed by a second spacing collar, 7^c, similarly provided with a flat end for bearing against the leather face, 6^b, of the upper valve, 6. The stem, 6^a, being threaded over its entire length, renders it possible to adjust the valves, 6 and 7, with respect to each other and with respect to the head, 7^a, so that they shall be not only correctly spaced apart for the proper throw from one seat to the other, but also both properly spaced from the diaphragm pneumatic, 5, upon which the head 7^a, rests. The spacing collars, 7^c, being first positioned on the stem to properly space the valves, each valve being then screwed up tightly against its spacing collar, the stem may be screwed in either direction to properly space the head from the lower valve, 7.

It will be understood that the primary pneumatics are mounted as usual in a plurality of bars, 20, 20, each channeled to form an exhaust chamber, 21, these exhaust chambers being connected at the ends by air trunks, not shown, with any suitable exhaust apparatus, not shown, and that the cover board, 22, of the exhaust chamber, 21, has a separate air port, 23, leading through it into the exhaust chamber, 21, opposite each primary pneumatic, the outer ends of said ports being in communication with the atmosphere through a channel, 24, formed in a cover plate, 25, which extends over the entire group of pneumatics and that the flushing tubes, 8, lead in through the cover board, 22, to the ports, 23, respectively.

Each power pneumatic, 11, with its controlling valve, 10, and secondary pneumatic, 9, is made as a complete unit adapted to be mounted separately and independently from each other unit on the exhaust chamber, 12, this construction being distinguished from the more familiar construction in which the secondary pneumatics are formed in a manner similar to the formation of the primary pneumatic above described, that is,

all having one side exposed in an exhaust chamber common to the entire row or series. In order to employ the construction of the independent power pneumatic units above described, the following construction is adopted. Each power pneumatic, 11, comprises a block, 25, upon whose lower side the moving member, 11^a, of the power pneumatic is connected by the bellows member whose chamber has communication through a port, 26, with the secondary pneumatic chamber, 27, which is cut in the top of the block, 25, and covered by a block, 28, in the upper side of which is formed the valve chamber, 29, from which a port, 30, leads into the secondary pneumatic chamber, 27. A cover plate, 30^a, above the block, 28, closes the valve chamber, except as to the air inlet port, 14, directly above the valve whose upper seat is the margin of said aperture on the under side of the cover plate. A channel, 32, leads from the chamber, 27, above the diaphragm pneumatic, 9, to the inner end of the block, 25,—that is, the end which is to be mounted on the vertical face of the exhaust chamber, 12, and from below the pneumatic, 9, a duct, 33, leads to the same end of the block—and the rear wall of the exhaust chamber has ports, 12^a, and 12^b, for registering with the end of said channel, 32, and the end of the duct, 33 when the block is mounted on the exhaust chamber. It will be understood that the two blocks, 25 and 28 are permanently secured together after the pneumatic diaphragm has been properly mounted in the block, 25, so the two constitute a unitary structure. This unitary structure is secured with its forward end against the rear face of the exhaust chamber, 12, chiefly by means of an axially hollow screw, 40, which is set through the rear wall of the exhaust chamber, (the forward wall being removable and being put in place after the power pneumatic units are all secured). This hollow screw takes into the end of the block, 25, being screwed into the duct, 12^b, in said block which leads to the under side of the secondary pneumatic. The axial duct in the screw does not lead through the end of the head, but having extended into the head leads out at the side of the latter, and a hollow nipple, 42, is there provided at which a tube, 43, is connected, said tube extending up in the exhaust chamber and out through the upper edge thereof for connection by means of the flexible tube, 8, with the corresponding primary pneumatic valve. The screw, 40, is exteriorly the form of a wood screw, that is, having a suitable taper and suitable form of thread to engage wood. The end of the blocks forming the power pneumatic unit are covered with felt or leather packing, 45, for insuring air-tight junction with the rear wall of the exhaust chamber and the yield-

ing character of this packing affords sufficient accommodation in securing the parts together to permit the screw always to be turned around to a position for causing the nipple to extend in the right direction without jeopardizing the tightness or security of the junction made by the screw between the power pneumatic block and the exhaust chamber. For further security, and to prevent the unit from turning on the screw, 40, a second attachment is made by means of a screw, 47, preferably set through the upper side of the block, 28, obliquely into the rear wall of the exhaust chamber, 12. In view of the fact that the hole bored for the screw, 40, is liable to so nearly penetrate the under surface of the block, 25, that there might be air leakage through the thin layer of wood remaining, it is preferable to reinforce the block at this point by a thin disk, 50, of any convenient impervious material.

In order that the stroke of the power pneumatics may be controlled with exactness so that there shall be no lost motion between the moving member of the power pneumatic and the connections with the wippen, and to make it possible to adjust the connections from each power pneumatic to the wippen connection on which it operates, according to the necessities of each case as they may slightly vary, there is provided an adjustable stop, 60, for the forward end of the lever 16, this stop being preferably made by means of a screw-eye, 61, set through a bar, 62, mounted on the forward side of the exhaust chamber, 12, at the lower edge, said screw-eye having on its lower end a felt-covered stop button, 63, which receives the contact of the forward end of the lever, 64, noiselessly. This stop, it will be seen, limits the recoil or expanding stroke of the power pneumatic. For limiting its stroke in the opposite direction, there is mounted upon the forward side of the abstract guide, 65, a bar, 66, in which there are set overhanging the lever, 17, of each wippen connection, a screw-eye, 67, precisely similar to the screw-eye, 61, similarly provided with a felt covered button at the lower end for noiseless contact with the lever, 17, in the collapsing stroke of the motor pneumatic.

A guide for the stem of the valve of the secondary pneumatic valve, 10, may be provided in the form of a bar, 36, mounted by securing it on one end of the upper side of the block, 25, adjacent to the channel, 32, and extending thence overhanging the diaphragm pneumatic, 9.

I claim:

1. The combination with the hammer action of a piano, a pneumatic action for an automatic playing mechanism, comprising a vertically-extending exhaust chamber, power pneumatics mounted on and extending from the rear wall of said chamber one

for each of the hammers to be operated having their moving walls arranged for collapsing upward and expanding downwardly; a lever for each power pneumatic fulcrumed between its ends and having its fulcrum supported by the exhaust chamber underneath the same; a manually operable stop adjustable for limiting the upward movement of the forward end of each said levers mounted upon the exhaust chamber and overhanging said end; a support fixed with respect to the hammer action and a manually operable adjustable stop mounted on said support overhanging the rear end of the lever for limiting the collapsing stroke of the pneumatic.

2. In combination with the hammer action of a piano, a pneumatic action for an automatic playing mechanism, comprising a vertically-extending exhaust chamber, horizontally-extending power pneumatics mounted upon and protruding from the rear

wall of said chamber and arranged for collapsing upwardly; a lever for each motor pneumatic having its fulcrum supported on the exhaust chamber at the lower side thereof and a rod connecting it with the moving wall of the power pneumatic for upward movement of its rear end upon the collapse of the pneumatic; a manually operable adjustable stop for the opposite movement of the lever mounted upon the exhaust chamber; a support fixed with respect to the hammer action; a manually operable adjustable stop on said support for limiting the hammer actuating stroke of the lever upon the collapse of the pneumatic.

In testimony whereof, I have hereunto set my hand at Steger, Illinois, this 7th day of December, 1912.

EMIL SWANSON.

Witnesses:

H. C. WEHLAN,
J. N. GANSEN, JR.