No. 728,965. PATENTED MAY 26, 1903.

R. W. PAIN.

# MEANS FOR MODIFYING THE ACTION OF STRIKERS IN MECHANISM FOR PLAYING KEYBOARD INSTRUMENTS.

APPLICATION FILED JAN. 23, 1902.

NO MODEL.

Fig. 1,

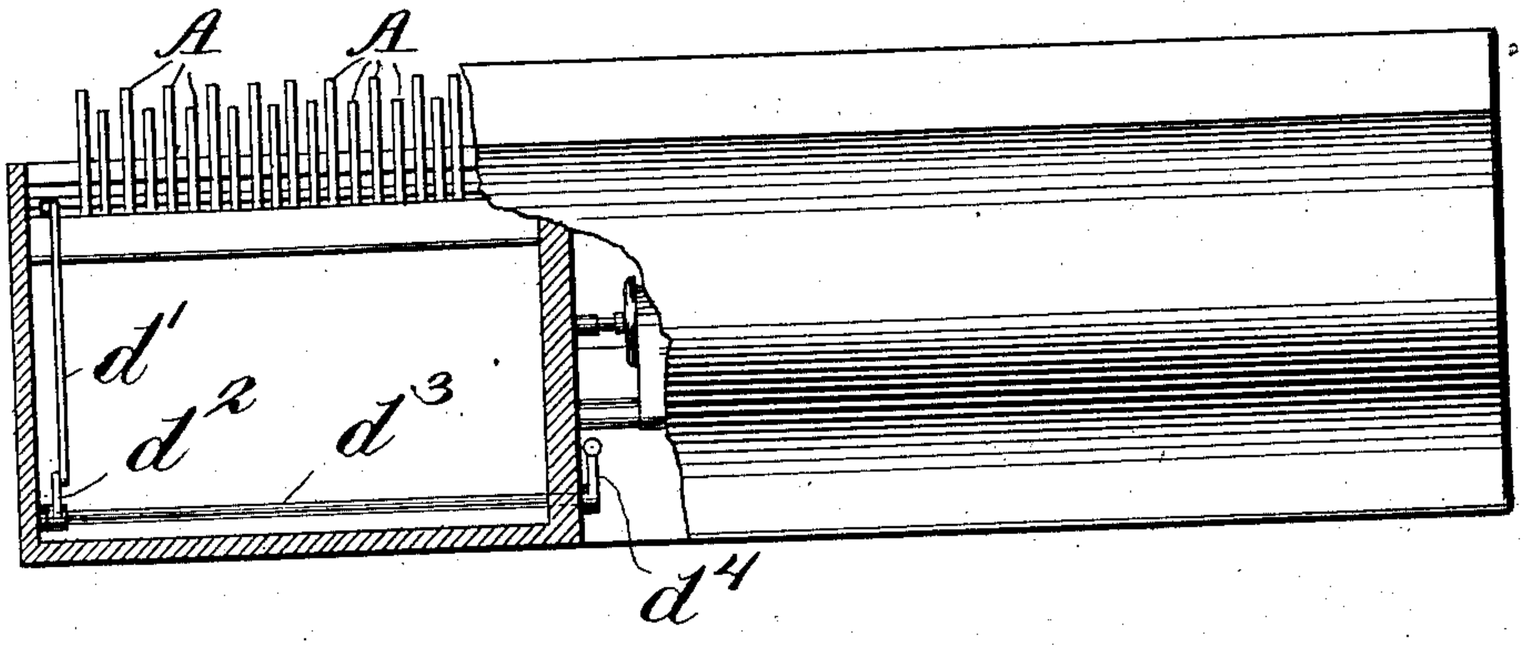



Fig. 3,

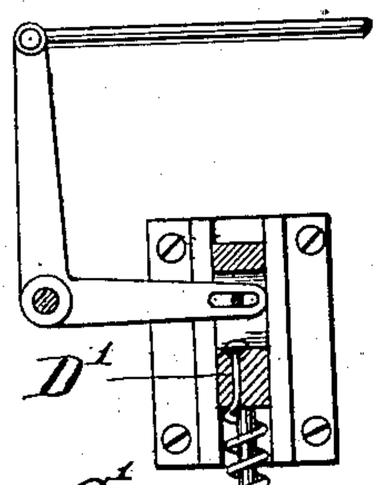
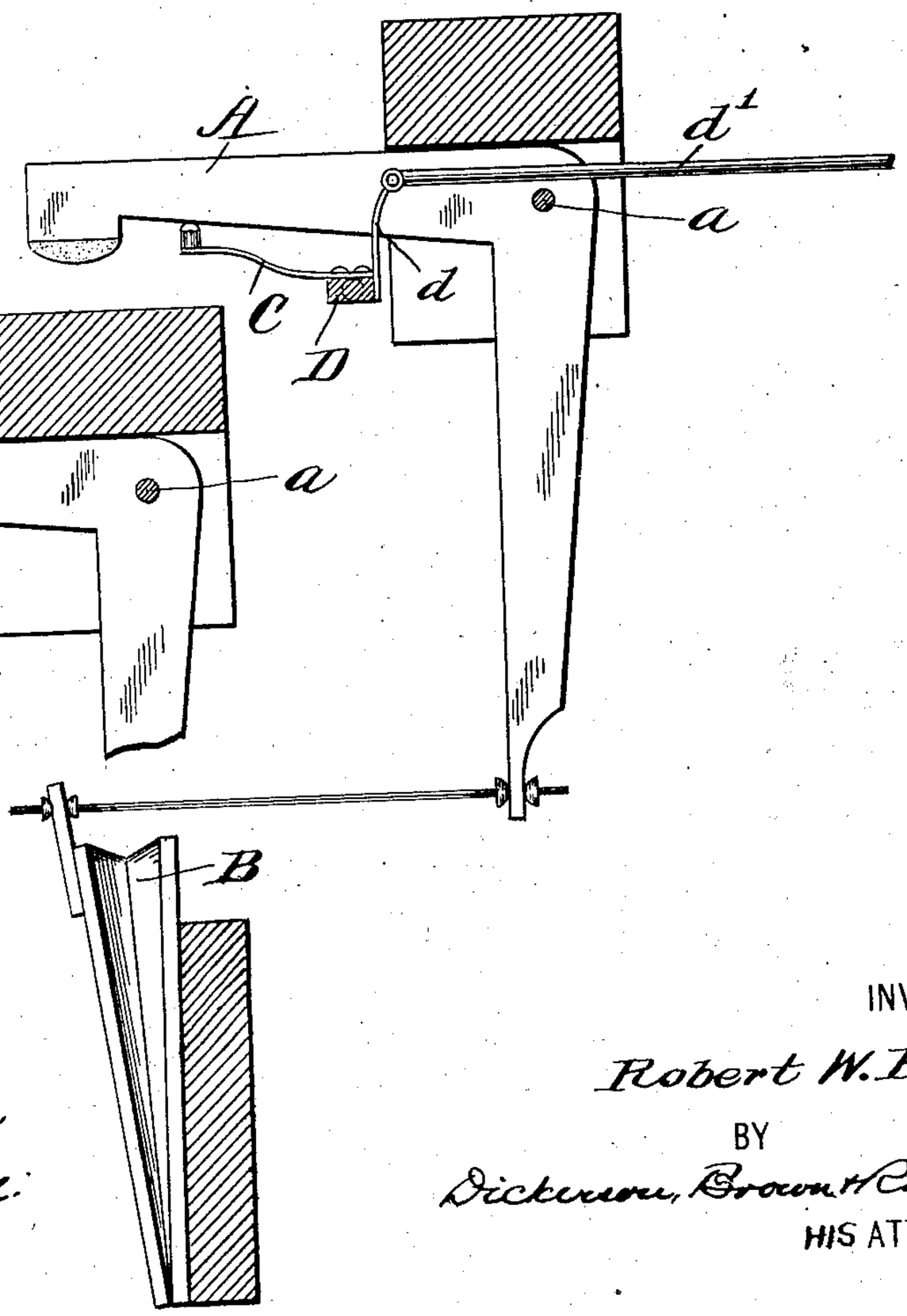



Fig. 2,




WITNESSES:

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# UNITED STATES PATENT OFFICE.

ROBERT WILLIARD PAIN, OF NEW YORK, N. Y., ASSIGNOR TO THE AEOLIAN CO., OF NEW YORK, N. Y., A CORPORATION OF CONNECTICUT.

## MEANS FOR MODIFYING THE ACTION OF STRIKERS IN MECHANISM FOR PLAYING KEYBOARD INSTRUMENTS.

SPECIFICATION forming part of Letters Patent No. 728,965, dated May 26, 1903.

Application filed January 23, 1902. Serial No. 90,893. (No model.)

*To all whom it may concern:*

Be it known that I, ROBERT WILLIARD PAIN, of the borough of Manhattan, city, county, and State of New York, have invented a new and useful Improvement in Means for Modifying the Action of Strikers in Mechanisms for Playing Keyboard Instruments, of which the following is a specification.

This improvement relates to mechanism for playing keyboard instruments, more particularly pianos. The object of the improvement is to provide for variations of expression.

My invention consists in apparatus for carrying out the above object and having the construction and general mode of operation substantially as hereinafter fully described, and shown in the accompanying drawings.

In the accompanying drawings, Figure 1 is a top view of certain parts of a mechanism embodying my improvement and intended for playing a keyboard musical instrument. Fig. 2 is a vertical transverse sectional elevation of the parts necessary to illustrate my improvement. Fig. 3 is a view similar to Fig. 2, illustrating fewer parts and a modification.

Similar letters of reference designate corresponding parts in all the figures.

A designates a number of strikers, which are supported in a case at such height that they may extend over the keys of a keyboard instrument. It will be seen in Fig. 1 that some are longer than others. This is necessary so that they may act upon the black as well as upon the white keys. In the present instance these strikers are made in the form of bell-crank levers fulcrumed upon a pin or pins *a* to a fixed part of the case. The upper arms extend horizontally over the keys of the instrument to be played, while the lower extend vertically downward to be operated by motors B. These motors B are of bellows-like construction and communicate internally with means whereby different pneumatic pressures may be established within them. These means may consist simply of suitable ducts connected with suction-bellows and appurtenant chambers. The movable board of each of these motors B is connected to the vertical arm of one of the striker-levers. This connection may be advantageously made by means of a rod screw-threaded near the ends to receive nuts.

Adjacent to the strikers are retarders for exerting modifying force to vary the action of the strikers. Each is to operate on one striker only. These retarders are shown in Fig. 2 as made in the form of springs C, coacting with the under sides of the upper horizontally-extending arms of the strikers. Suitable means are provided for varying the strength of the modifying force exerted on the strikers in several different degrees, and in this instance the springs extend from a rock-shaft D, which may be manipulated by any suitable means to adjust it into either of its possible positions. As here shown, an arm *d* extends from one end of the rock-shaft D and is pivotally connected to one end of a pitman *d'*, which at the other end is pivotally connected to a crank $d^2$, extending from a rock-shaft $d^3$. This rock-shaft $d^3$ extends to a position convenient for the operator of the instrument and is there provided with a handle $d^4$.

When the rock-shaft D is in the position in which it is illustrated in Fig. 2, the springs C impinge against the upper horizontally-extending arms of the strikers and then oppose the action of the motors B, but only to such an extent as to modify the action of the latter. By slightly varying the position of the rock-shaft different degrees of tension of the springs C to the motors B may be secured. An adjustment of the rock-shaft far enough will entirely nullify the springs C by moving them wholly out of the range of the strikers.

In Fig. 3 I have shown a modification wherein the application of the modifying force to the strikers may be controlled and reversed. The bar D' is capable of sliding up and down and arranged above the upper horizontally-extending arms of the strikers, although it might be arranged under the same. From this sliding bar extend a number of helical springs C', which are normally very weak and whose coils in their normal condition are considerably separated. Their lower extremities are attached to the strikers. Hence the springs may either push or pull the strikers.

By adjusting the sliding bar into one posi-

tion through a suitable handle arranged conveniently for the operator of the instrument the springs C′ will not exert any appreciable influence upon the strikers. By raising the bar a sufficient tension may be put upon the springs to cause them to appreciably pull upon the strikers, and by lowering the bar from the first-mentioned position a sufficient resilience may be given to the springs to compel them to push upon the strikers. Thus the springs may augment or reduce the effectiveness of the motors B upon the strikers.

To prevent the flection of the springs C′, pins $d^5$ may extend from the bar D′ through the springs for a considerable distance.

What I claim as new, and desire to secure by Letters Patent, is—

1. The combination with a striker and means for actuating the same, of means for exerting modifying force to vary the action of the strikers, and an adjustable mechanism for controlling and reversing the application of said modifying force.

2. The combination with strikers and means for actuating them, of means for exerting modifying force to vary the action of the strikers, and an adjustable mechanism for controlling the operation of said force to either reinforce or oppose the action of the strikers.

3. The combination with strikers for operating the keys of musical instruments, of pneumatics for operating the strikers, a spring for each striker for modifying the action of the strikers under the influence of the pneumatics, and means for adjusting said springs to change the directions of their force relatively to the strikers, substantially as set forth.

4. The combination with the striker and striking mechanism for operating the keys of a musical instrument, of modifying-springs acting at one end upon the strikers, and adjustably secured at the other, and levers for adjusting the adjustable end to mechanically modify the effect of the springs, for substantially the purposes set forth.

5. The combination with the striker and striking mechanism for operating the keys of a musical instrument, of modifying-springs acting at one end upon the strikers, and adjustably secured at the other by an adjustable slide and slideway, and means for moving the said slide, for substantially the purposes set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ROBERT WILLIARD PAIN.

Witnesses:
EDW. F. COYLE,
GEO. E. CRUSE.