C. H. L. PLASS.
Pianoforte.

No. 210,223. Patented Nov. 26, 1878.

Fig. 1.

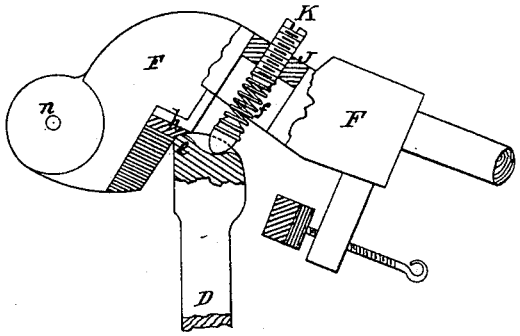


Fig. 3.

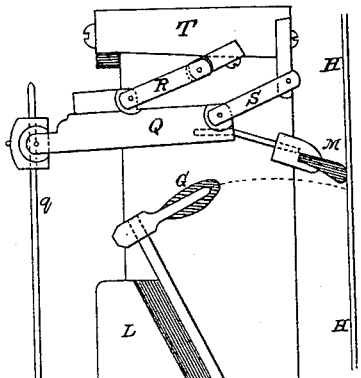
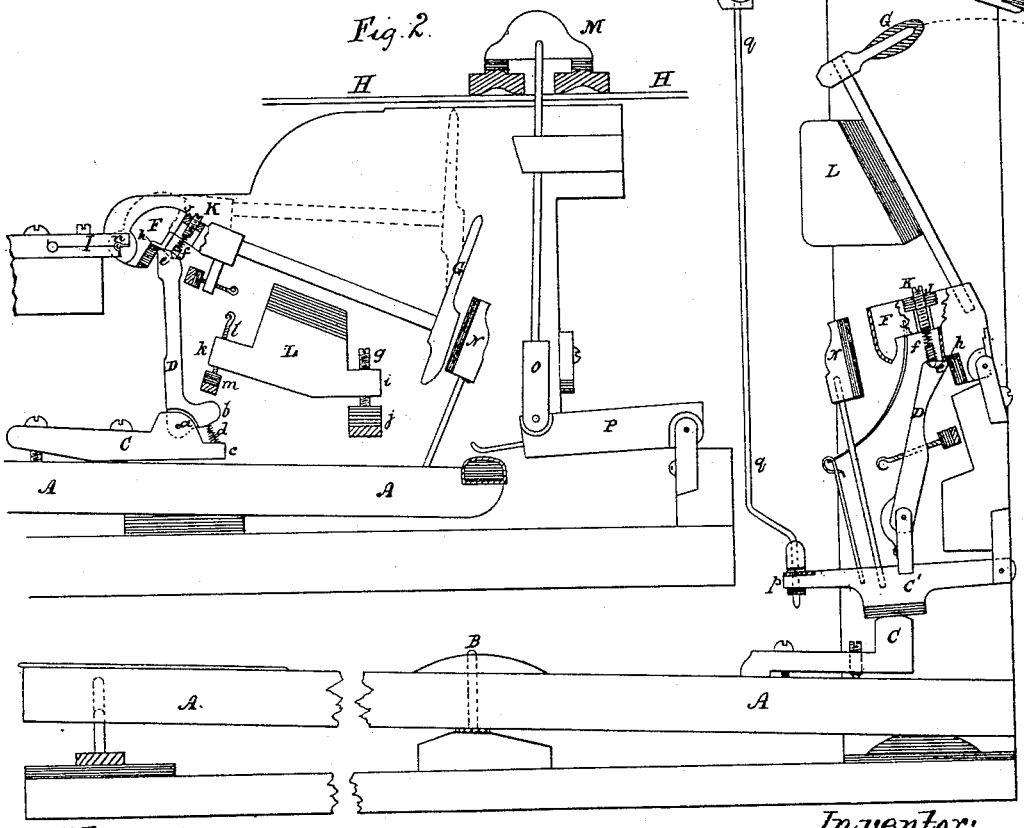


Fig. 2.



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UNITED STATES PATENT OFFICE.

CARL H. L. PLASS, OF HAMBURG, GERMANY.

IMPROVEMENT IN PIANO-FORTES.

Specification forming part of Letters Patent No. **210,223**, dated November 26, 1878; application filed July 29, 1878.

To all whom it may concern:

Be it known that I, CARL HEINRICH LUDWIG PLASS, of Hamburg, Germany, have invented Improvements in Piano-Fortes, of which which the following is a specification:

The objects of my invention are, first, to support each hammer upon a helical spring, which is secured to the hammer-butt by a screw, the free end of the spring taking into a recess in the upper end of the hopper, in order that very rapid movements of the hammers may be communicated from the keys.

The improvements hereinbefore referred to are clearly shown in the accompanying drawings, in which—

Figure 1 represents in detail my spring and screw, and Fig. 2 their position in a complete action as fitted to a horizontal instrument.

A is the key; B, the pivot or pin, on which it moves when pressed upon by the finger of an operator. C is the jack, to which the hopper D is hinged or jointed at *a*. This hopper-stick has a tail-piece, *b*, between which and a projection, *c*, of the jack a helical or spiral spring, *d*, is fitted to force the nose *e* of the hopper-stick into the notch *h* under the butt or tail-piece F of the hammer G each time the hammer falls after striking its string or wire H. The tail-piece F of the hammer is hung or pivoted to the rail I in the usual manner; but it has within the body of it a screw-nut, J, through which a screw-pin, K, passes. The lower end of this pin has attached a helical or a spiral spring, *f*, whose opposite end being fitted with a leather pad bears in a recess formed in the top of the hopper. This screw-pin and spring form an important portion of this invention, as by their combination with the hopper, which has to execute a short movement only, blows of the hammer on the string or wire are produced most powerful or very soft, and with almost unlimited quickness, when and depending upon the manner in which the key is acted upon. By turning the screw-pin K more or less, the desired strength can be easily given to the spring, which is of very great advantage, especially should the spring become weak by heavy or long use.

The same amount and volume of sound, as above mentioned, is, by the action of the spring, produced when the key A, having been pressed down completely, is lifted a short distance only and acted upon again, leaving nothing to be desired as regards clearness of sound.

Through a projection, *i*, at the back of the hammer-rest L a screw-pin, *g*, is passed, its lower end having a pad or buffer, *j*, upon it to receive the back part of the key when acted upon. By turning this screw-pin more or less the movements which the key has to execute are regulated with the utmost ease and certainty.

In the front projection *k* of the hammer-rest L a screw-pin, *l*, is passed, whose lower end is fitted with a pad or buffer, *m*, to be brought more or less close to the tail-piece *b* of the hopper D to draw the nose *e* of the hopper-stick out of the notch *h* after having lifted the hammer G, so that in that position the hopper brings the spring *f* in its full action, and consequently keeps the hammer close to the spring or wire H. By turning the screw-pin K more or less the hammer can be held at any suitable distance from the string or wire.

The regulation of the keys, so as to adjust them as regards the different weights of the hammers in the higher and lower octaves, is effected by plugging the front parts only of the keys with lead. They need not, therefore, be plugged in the back part, because they get the full weight of the hammers, which causes a considerable fall of the back part of the keys.

The hammer-rest L (shown in the drawing, Fig. 2) is only to support the hammer after the key is removed, which can be done by lifting it off the pin, the jack C, the hopper D, and and the sticker N going with it.

The damper M is of ordinary construction, and the parts N O P also.

It will be observed by the drawing, Fig. 1, that the working parts of the action move upon two centers, *a* and *n*, only.

In fitting the invention to an upright piano, (see Fig. 3,) the screw-pin K in the butt F of the hammer G has attached the helical or spiral spring *f*, as explained for Fig. 1. In this upright action, the hopper-stick D is jointed to a stud on a horizontal piece, C′, the front end *p* of which carries a rod, *q*, for oper-

ating the damper M by an upward circular movement through its connection with links R S from the damper-rail T, the damper-pad or cushion being thus brought to act upon the spring H to damp it at about the spot at which it had been previously struck by the hammer G. The horizontal piece C′ rests upon the jack C, and is acted upon by the key A.

By hanging the damper M in the manner described and shown, the vibrations of a string are stopped with greater certainty and with more uniformity.

I claim as my invention—

The combination, in a piano-forte, substantially as described, of a helical spring between the hopper-stick and the hammer-butt, said butt having a screw-pin for regulating the spring-pressure.

CARL HEINRICH LUDWIG PLASS.

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