

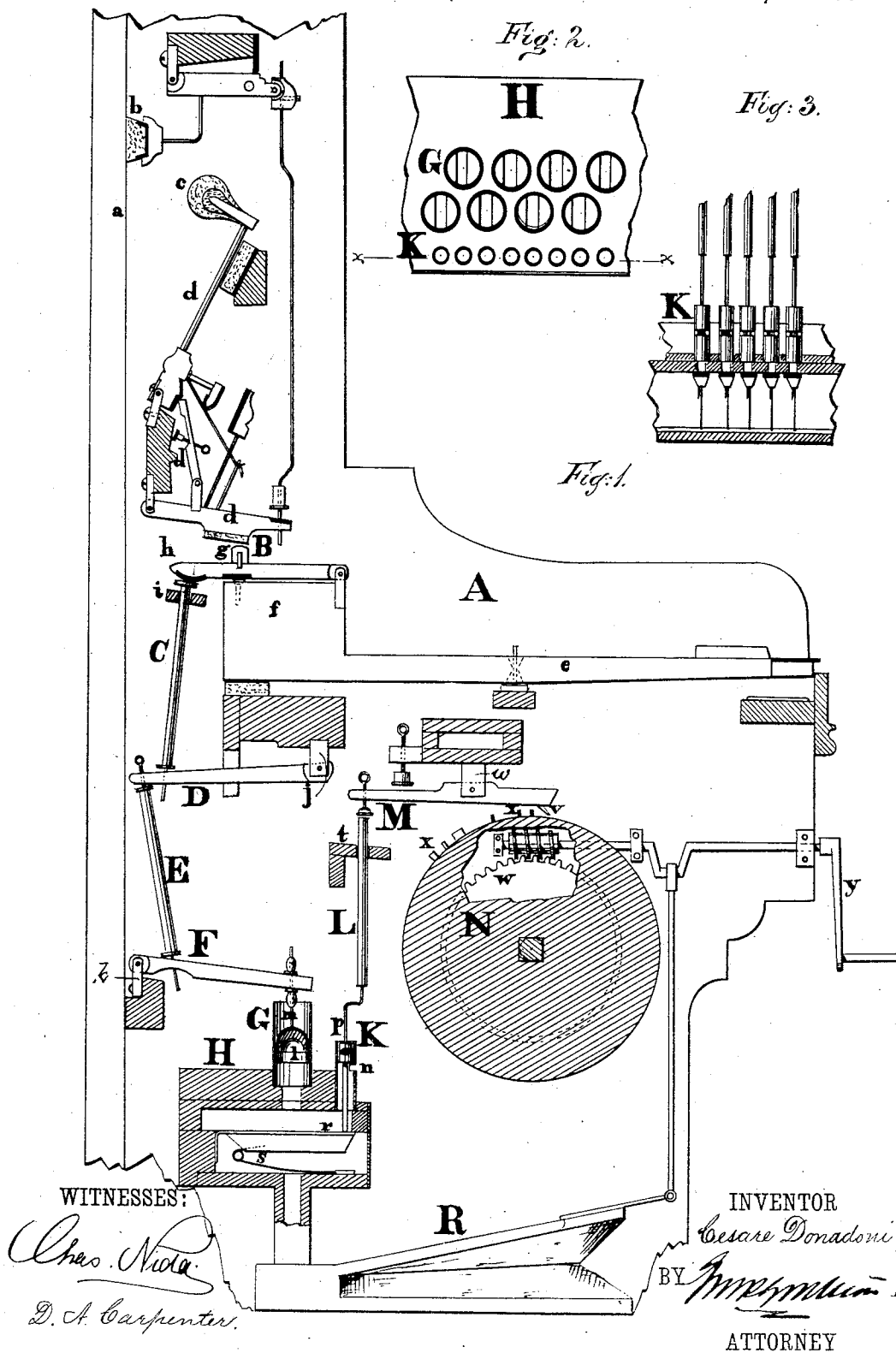
(No Model.)

C. DONADONI.

MECHANICAL MUSICAL INSTRUMENT.

No. 310,498.

Patented Jan. 6, 1885.



UNITED STATES PATENT OFFICE.

CESARE DONADONI, OF BERLIN, GERMANY, ASSIGNOR TO HIMSELF AND POHL, OF SAME PLACE.

MECHANICAL MUSICAL INSTRUMENT.

SPECIFICATION forming part of Letters Patent No. 310,498, dated January 6, 1885.

Application filed April 7, 1884. (No model.) Patented in England January 25, 1882, No. 376; in Austria-Hungary March 22, 1882, No. 2,407 and No. 10,274; in Belgium April 15, 1882, No. 57,412; in France April 28, 1882, No. 147,394, and in Germany July 25, 1882, No. 23,552.

To all whom it may concern:

Be it known that I, CESARE DONADONI, a subject of the King of Italy, residing at the city of Berlin, German Empire, have invented
5 a new and useful Improvement in Piano-Fortes, (for which I have obtained a patent in France, No. 147,394, dated April 28, 1882; in Belgium, No. 57,412, dated April 15, 1882; in Austria-Hungary, No. 2,407 and No. 10,274, dated
10 March 22, 1882; in the German Empire, No. 23,552, dated July 25, 1882; in Great Britain and Ireland, No. 376, dated January 25, 1882,) of which the following is a specification, reference being had to the accompanying sheet of
15 drawings, forming part hereof.

This invention relates to combined ordinary and mechanical or automatic piano-fortes; and the invention consists in the mechanism, combinations, and arrangements hereinafter fully
20 described, and particularly pointed out in the claims.

In the accompanying sheet of drawings referred to, Figure 1 is a longitudinal section; Fig. 2, a plan or top view of cylinders; Fig.
25 3, a cross-section taken in the line *x x*, Fig. 2.

Similar letters of reference indicate like parts in the several figures.

This invention relates particularly to the mechanical production of musical sounds and
30 airs—that is, the production of musical sounds from a piano or similar instrument by actuating its movements or mechanism through or by means of mechanical devices in connection with a crank or other means for operating
35 the same. To that end I construct my piano A (which may be of the well-known upright form of such instruments, or any other form that will adapt it to the purpose of this invention) with the well-known strings *a*,
40 dampers *b*, hammers *c*, hammer-levers *d*, the ordinary key-levers *e*, and such ordinary and well-known mechanism in connection with the hammers, dampers, key-levers, and manuals of a piano-forte which up to this point in my
45 invention in no wise differ from that which is commonly found in a piano to be operated by the hands of the player. In addition, however, to this well-known mechanism I pivot

to the rear ends of the key-levers *e* (or rather to the counter-balances *f* formed on such ends) 50 the ends of levers B. These levers B have secured to their upper surfaces projections *g*, the rear ends of the levers B protruding somewhat beyond the ends of the key-levers *e*, as at *h*. Passing through suitable guide-blocks, 55 *i*, are rods C, the upper ends of which rods rest in contact with or against the under side of the projections *h* of the levers B, and the lower ends of the rods C rest upon levers D, which are pivoted to suitable blocks, *j*. The 60 rear ends of the levers D rest upon the upper ends of rods E, the lower ends of these rods E resting upon levers F, the rear ends of the levers F being pivoted to suitable blocks, *k*. These levers F extend to and over a series of 65 cylinders, G, which cylinders are vertically fixed on the upper surface of a wind-chest, H, below which wind-chest is placed a bellows, R. As will be seen, by arranging the pins *x* on the pin-barrel N in a given position and relation to one another, so as to correspond with the notes of a given piece of music, these pins, through intermediate pistons and connecting-rods, alternately trip the levers B, and corresponding notes through 75 the hammers of the instrument are sounded on its strings, and the music produced. Into each cylinder G is snugly fitted a piston, *l*, each piston having a vertical piston-rod, *m*. These piston-rods are secured to the ends of 80 the levers F. Also fixed to the upper surface of the wind-chest H are a series of smaller cylinders, K. Each of these smaller cylinders has an opening, *n*, and into each of these cylinders K is snugly fitted a piston, *o*, each piston having attached to it a piston-rod, *p*, which rods 85 pass through the pistons *o*, the lower ends of the rods resting on valves *r*, which valves are provided with springs *s*. The upper ends of these piston-rods *p* are fixed to vertical rods 90 L, which rods pass through suitable guides in a block, *t*, and the upper ends of these rods L abut against one end of the levers M, which levers are pivoted to a block, *u*, the other end of the levers M being provided with pins *v*. 95 Suitably journaled to the casing or frame of

the piano is a pin-barrel, N, with a gear-wheel, *w*, at one end and a series of pins, *x*, protruding from its surface. Also through the casing of the piano is suitably journaled a crank-shaft, with a worm-wheel secured to one of its ends and a crank, *y*, at its other end.

Now, when my piano is constructed substantially as hereinbefore described, it is operated in this wise: When the piano is played upon in the ordinary way by the hands of the player, the keys are manipulated on the ends of the levers *e* in precisely the same manner and with the same effect as with any piano, the action being wholly independent and disconnected from the second means of operating the piano, which second means consist of the mechanical playing through or by means of the pin-barrel N. By turning the crank *y* the worm-wheel fixed to its shaft, meshing into the gear-wheel *w* on one end of the pin-barrel N, causes said pin-barrel to revolve on its journals, and as this barrel revolves the pins *x* in the circumference of the same are brought successively in contact with the tripping-pins *v* in the levers M, forcing downward thereby the inner ends of these levers, which in turn force downward the vertical rods L, these rods in turn forcing downward the piston *o* in the smaller cylinders K. The protruding lower parts of the piston-rods *p* of these pistons press downward, and thereby open the valves which admit the air from the bellows R into the cylinder G, where it forces upward the pistons *l*, whose rods *m* raise the levers F, which in turn move upward the rods E, these rods lifting the levers D, and these last-named levers pushing upward the rods C, which last-named rods lift one end of the levers B, causing its projection *g* to raise the hammer-levers *d*, and thereby through the ordinary hammer mechanism (not necessary to describe) cause the hammers *c* to impinge against the strings *a* of the instrument, producing the musical sounds, and as the levers *d* in this way actuate the hammers they also operate the dampers *b*. As the crank and its shaft are turned it not only revolves the pin-barrel N in the manner described, but it also, by means of a jointed connecting-rod or similar device, operates the bellows R, in connection with a spring (not shown) fixed in any obvious manner to the bellows. When the pistons *l*, in the cylinders G, have completed their upward stroke, that they may be returned promptly to their lower position, so as to be ready for the next upward stroke, the descent of these pistons forces up the valve *r* and causes the air to enter the small cylinders K, where it finds an exit through openings *n* formed therein. It is also obvious that the mechanical operation produced by the turning of the pin-barrel N is independent of the manual or key board of the piano designed to be operated by the hands of the performer, so that the instrument can be used in the ordinary manner or mechanically, as desired.

I am aware of the German patent granted to C. Frati, numbered 18,024, and I do not claim anything therein shown.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A combined ordinary and mechanical or automatic piano-forte consisting of the ordinary piano-forte having the usual key-levers, *e*, provided at their inner ends with levers B, the rotatable pin-barrel N, the levers M, operated by said pin-barrel, the wind-chest H, having valves *r*, and bellows for filling said chest with air, said chest also having a series of cylinders, G and K, having pistons *l* and *o*, respectively, and rods in said pistons, the rods of pistons *o* being extended to levers M, to be operated by said levers to open the valves *r*, to admit pressure of air to move the piston *l*, to operate, through the levers F and B and suitable connections, the hammers *c* and dampers *b*, all the parts being combined and constructed substantially as shown, and operating as described.

2. In combination with a piano-forte having the ordinary key-levers, *e*, the pin-barrel N, and mechanism for revolving the same, the wind-chest H, and means, substantially as described, for filling the same, the said chest provided with a series of cylinders, G and K, with pistons and rods therein, and suitable levers and rods and connections therefor for operating said pistons from the pin-barrel to operate the hammers *c* and dampers *b*, as set forth.

3. In combination with a piano-forte having the ordinary key-levers, *e*, provided with levers B, fulcrumed on said key-levers, the pin-barrel and mechanism for rotating the same, the wind-chest H, and means, substantially as described, for filling the same, the said chest provided with a series of cylinders, G and K, with pistons and rods therein, and suitable levers and rods and connections therefor for operating said pistons from the pin-barrel to operate the hammers *c* and dampers *b*, as set forth.

4. In a combined ordinary and mechanical or automatic piano-forte substantially as described, the wind-chest H, and means for filling the same with air, said chest provided with the cylinders G, having pistons *l* therein, combined with valves *r*, and means for operating them to admit air to the said cylinders G, to move the pistons *l* to operate the hammers *c* and dampers *b*, as set forth.

5. In a combined ordinary and mechanical or automatic piano-forte, the wind-chest H, provided with the series of cylinders G and K, the latter having the openings *n*, for the purpose set forth.

CESARE DONADONI.

Witnesses:

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B. ROl.