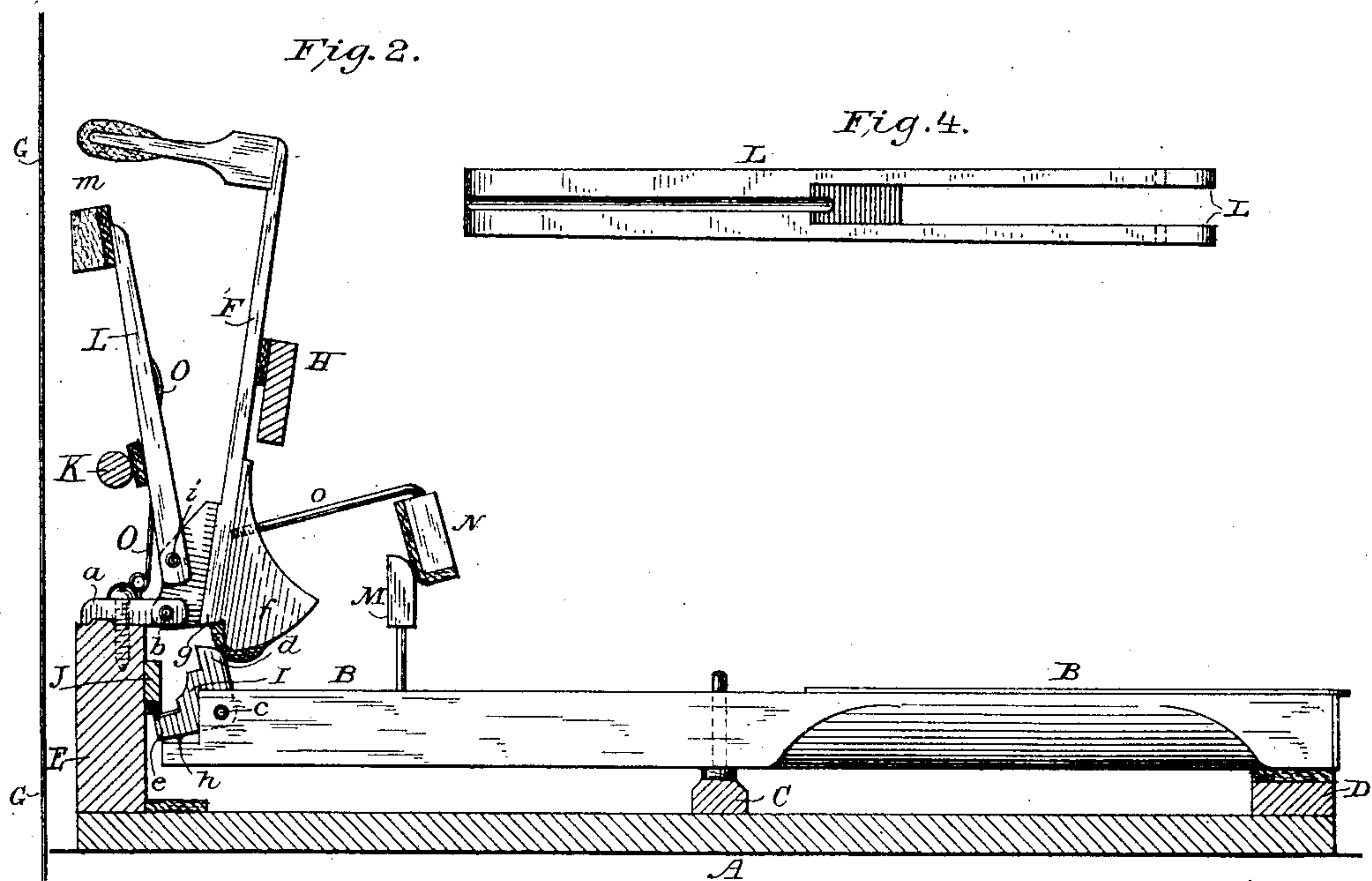
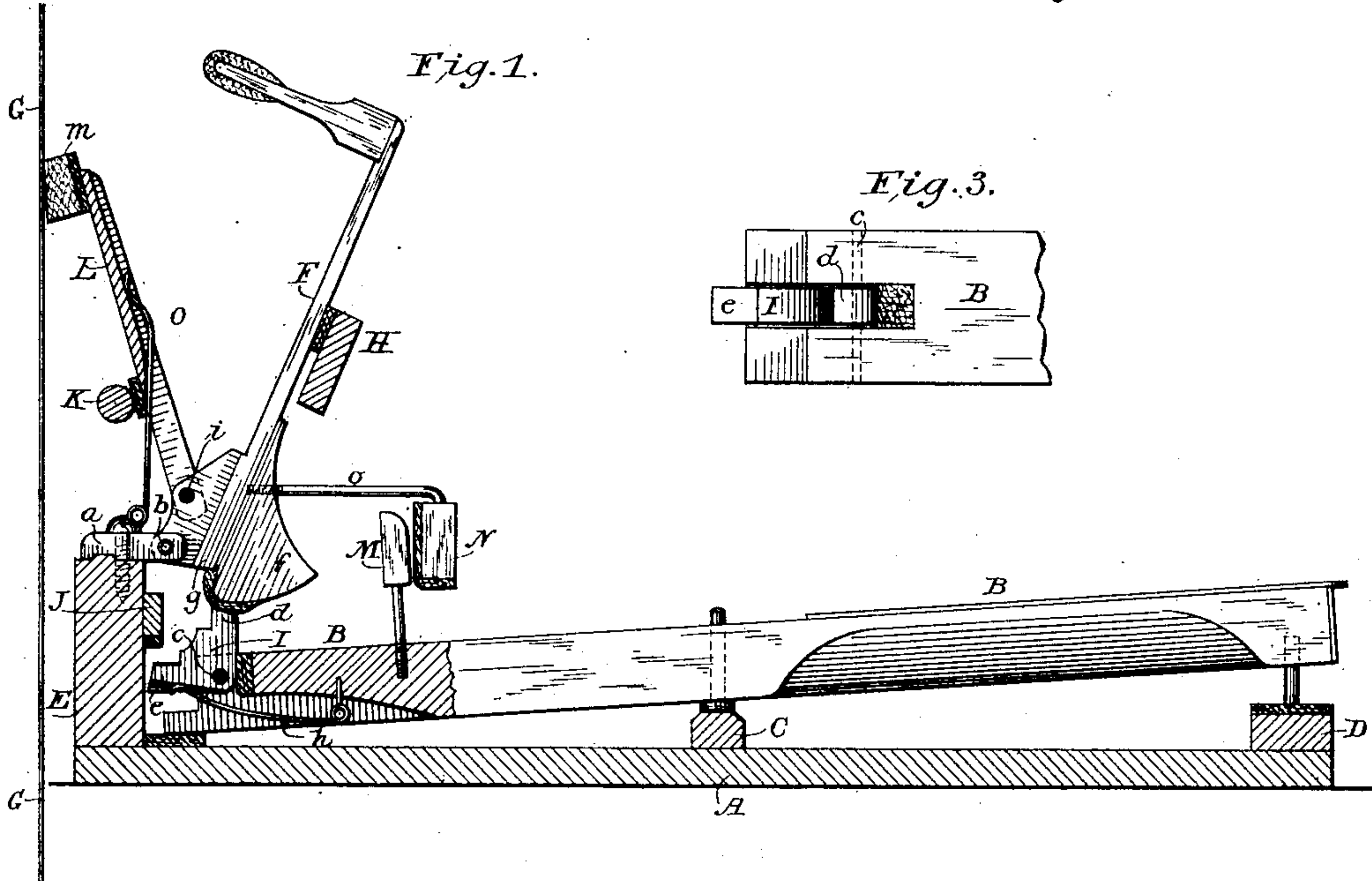


(No Model.)

C. BUNCE & E. H. BENEDICT.
ACTION FOR UPRIGHT PIANOS.

No. 427,667.

Patented May 13, 1890.



Witnesses

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ACTION FOR UPRIGHT PIANOS.

SPECIFICATION forming part of Letters Patent No. 427,667, dated May 13, 1890.

Application filed July 5, 1889. Serial No. 316,539. (No model.)

To all whom it may concern:

Be it known that we, CHARLES BUNCE and EDWIN H. BENEDICT, of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Actions for Upright Pianos, of which the following is a specification.

This invention relates in its principal features to the transmitting mechanism interposed between the key and the hammer and to the operative mechanism of the damper-lever.

The invention is illustrated in the accompanying drawings, in which—

Figure 1 is a vertical section of an upright-piano action, showing the same in its usual state of rest. Fig. 2 is a similar section showing the position of the parts when the key is held depressed. Fig. 3 is a plan view of the rear end of the key, and Fig. 4 is a detail view of one of the damper-levers.

A is the bottom rail of the key-frame, B is one of the keys, C is the usual center rail to which the keys are pivotally connected, and D is the front rail of the key-frame, all of which parts are of ordinary and well-known construction.

E is the hammer-butt rail to brackets *a*, on which the hammers F are pivoted.

G is one of the strings, and H is the padded hammer-shank rail.

The hammer-butt rail E is located immediately behind the extreme ends of the keys, so that the pivot *b* of each hammer is almost directly over the rear end of its key. The motion of the key is transmitted to the hammer by means of a jack I, which is pivoted at *c* in a slot in the extreme rear end of the key. This jack is composed essentially of two arms *d* and *e*, extending at right angles to each other, the pivot *c* being at the junction of the two arms. The jack-arm *d* extends upwardly at approximately right angles to the surface of the key and above the surface of the key. When the hammer is in its position of rest, its butt *f* rests upon the jack-arm *d*. The hammer-butt *f* extends back of the hammer-shank *g* and below the pivotal point *b* of the hammer, and it is the padded corner only of the butt which rests upon the jack-arm *d*. The supporting-point of the hammer is thus below its pivotal point. When

the key is depressed by the finger, the jack is lifted, thus throwing the hammer against the string. As the jack is lifted the end of its arm *d* on which the hammer-butt rests approaches closer and closer to the pivot *b* of the hammer, and hence it follows that the speed of the hammer is accelerated and the force of the blow is increased. This acceleration is due to the fact that the point of operative contact between the jack and the hammer-butt is progressively nearer the pivot, and the movement of the jack being uniform, it is evident that a given amount of movement exerted on a point near the pivot of the hammer will move the hammer through a greater arc in a given time than the same amount of movement exerted on a point more remote from the pivot. The other arm *e* of the jack extends behind the extreme rear end of the key and substantially in line with the length of the key. The extreme end of the jack-arm *e* extends almost into contact with the hammer-butt rail. To the hammer-butt rail is attached a projecting padded stop-rail J, which is immediately above and in the path of the end of the jack-arm *e*. The relative position of the stop-rail J is such that just before the hammer strikes the string the jack-arm *e* encounters the rail J, so that the further movement of the key causes the jack to turn on its pivot *c*, the upper jack-arm *d* moving toward the hammer-butt rail and out from operative contact with the under side of the hammer-butt. The jack is thus moved to such a position that it will not interfere with the rebound of the hammer, the corner of the hammer-butt dropping back on the rebound in front of the forward edge of the upper arm *d* of the jack, as shown in Fig. 2. When the finger is lifted from the key, so that the rear end of the key resumes its normal state of rest, the jack is turned on its pivot *c* to its proper normal position of rest by a spring *h*.

The operating mechanism of the hammer thus consists in the simple pivoted jack interposed between the key and hammer, the jack being pivoted directly to the key and bearing directly upon the hammer.

The padded damper-rail K is located directly above the hammer-butt rail. The damper-lever L is pivoted at *i* to the hammer-

lever, the damper-lever being formed so as to straddle the hammer-lever. The pivot *i* is below the damper-rail and is close to but above the pivot *b* of the hammer. The damper-lever rests at an intermediate part of its length on the front side of the damper-rail, so that it is located between the damper-rail and the hammer. The damper-lever is extended a sufficient distance above the damper-rail, so that the damper pad or head *m* rests normally against the string.

When the hammer is raised to strike the string, the pivot *i* of the damper-lever is carried in an arc of a circle the center of which is the hammer-pivot *b*. This movement causes the lower end of the damper-lever to be moved toward the string and its upper end to move away from the string, (the damper-rail acting as the fulcrum of the damper-lever,) thus leaving the string free to be vibrated by the hammer. Owing to the damper-lever being thus connected directly to the hammer it is moved continuously away from the string as the hammer is moved toward the string, so that there is a constant and uniform force presented by hammer and damper. This is an important feature of the invention, since it overcomes the unevenness of touch in ordinary actions wherein the initial movement of the damper-lever is not inaugurated until after the hammer has moved some distance, so that the pressure of the damper-spring is not felt until after the key is in motion. In the present construction, however, the pressure to be overcome is uniform, so that evenness of touch is secured.

In order to prevent the hammer rebounding back to its normal position of rest while the key is still held depressed, a padded hammer-check *M* is secured directly to the key back of the center rail and extends vertically from the upper face thereof. Coacting with this hammer-check is a padded bumper *N*, which is secured directly to the hammer by a stem *o*. When the key is at its normal state of rest, the bumper *N* is just forward of and out of contact with the hammer-check. When the key is depressed, however, the hammer-check is raised, so that when the hammer rebounds after striking the string the bumper *N* comes in contact with the hammer-check, holding the hammer partly lifted, and also holding the damper-pad out of contact with the string. When the key is released and the parts are free to return to their normal positions, the hammer is dropped, the damper-lever is moved back, and the damper pad or head is pressed firmly against the string by means of a spring *O*, which is fastened to the hammer-butt rail, passes upward between the forked or straddled lower ends of the damper-lever, and bears against the front side of the damper-lever above the damper-rail *K*. Since the entire mass of the hammer is in front of its pivot, its weight causes it to resume its lowermost position; but its movement is accelerated and rendered certain and prompt by the

action of the damper-spring, which accomplishes this result, as well as retracting the damper-lever and pressing its head against the string.

We claim as our invention—

1. In an upright-piano action, a key, the hammer-butt rail behind the same, and a hammer pivotally connected to said rail with its pivot above the rear end of the key and with its butt extending below its pivot, in combination with a jack pivoted to the rear end of the key, with which jack the hammer-butt coacts, substantially as set forth.

2. In an upright-piano action, a key having a slot in its rear end, the hammer-butt rail behind the same, and a hammer pivotally connected to said rail with its pivot above the rear end of the key and with its butt extending below its pivot, in combination with a jack pivoted in the slot in the rear end of the key, with which jack the hammer coacts, substantially as set forth.

3. In an upright-piano action, a key having a slot in its rear end, the hammer-butt rail behind the same, a projecting stop-rail on the key side of said hammer-butt rail, and a hammer pivotally connected to said hammer-butt rail with its pivot above the rear end of said key and with its butt extending below its pivot, in combination with a jack pivoted in the slot in the rear end of the key, said jack having an upwardly-extending arm with which the hammer-butt coacts and a rearwardly-extending arm which extends beyond the rear end of the key beneath said stop-rail, with which it coacts when the key is operated, substantially as set forth.

4. In an upright-piano action, a hammer and a damper-rail, in combination with a damper-lever pivoted to said hammer and having said damper-rail as its fulcrum, substantially as set forth.

5. In an upright-piano action, a hammer and a damper-rail, in combination with a damper-lever pivoted to said hammer below said damper-rail and bearing against said damper-rail with its damper-head above said rail, substantially as set forth.

6. In an upright-piano action, a hammer-butt rail and a damper-rail above said hammer-butt rail, in combination with a hammer pivotally connected to said hammer-butt rail, and a damper-lever pivoted to said hammer below said damper-rail and having its damper-head above said damper-rail, substantially as set forth.

7. In an upright-piano action, a hammer-butt rail and a damper-rail above said hammer-butt rail, in combination with a hammer pivotally connected to said hammer-butt rail, a damper-lever pivoted to said hammer below said damper-rail and having its damper-head above said damper-rail, and a damper-spring bearing on said damper-lever above said damper-rail, substantially as set forth.

8. In an upright-piano action, a hammer-butt rail, a damper-rail above said hammer-

butt rail, in combination with a hammer piv-
otally connected to said hammer-butt rail, a
damper-lever having its lower end forked and
straddling said hammer, to which it is pivoted
5 below said damper-rail, said damper-lever
having its head above said damper-rail, and
a damper-spring secured to the hammer-butt
rail, extending between the forked ends of
the damper-lever, and bearing against the
10 damper-lever above the damper-rail, substan-
tially as set forth.

9. In a piano-action, a hammer-butt rail, a
damper-rail, a key, a jack pivoted to the rear
end of said key, a hammer pivotally connected
15 to said hammer-butt rail and acted upon by
said jack, and a damper-lever pivoted to said

hammer and bearing against said damper-
rail, in combination with a vertically-extend-
ing hammer-check carried by the key on its
rear portion, and a bumper carried by said 20
hammer and located, when at rest, immedi-
ately in front of said hammer-check, substan-
tially as set forth.

In witness whereof we have hereunto signed
our names in the presence of two subscribing 25
witnesses.

CHARLES BUNCE.
EDWIN H. BENEDICT.

Witnesses:

WM. C. BENEDICT,
FREDERICK R. YOUNG.