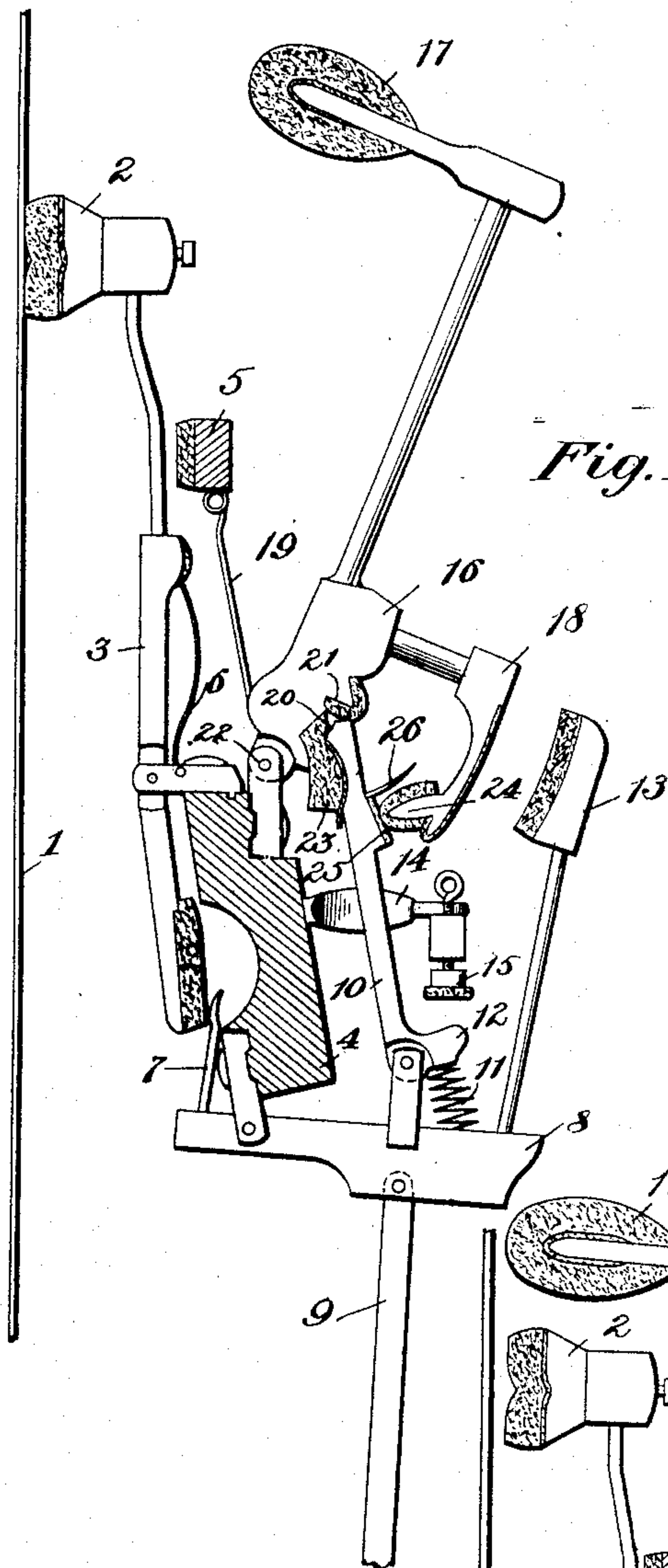


(No Model.)

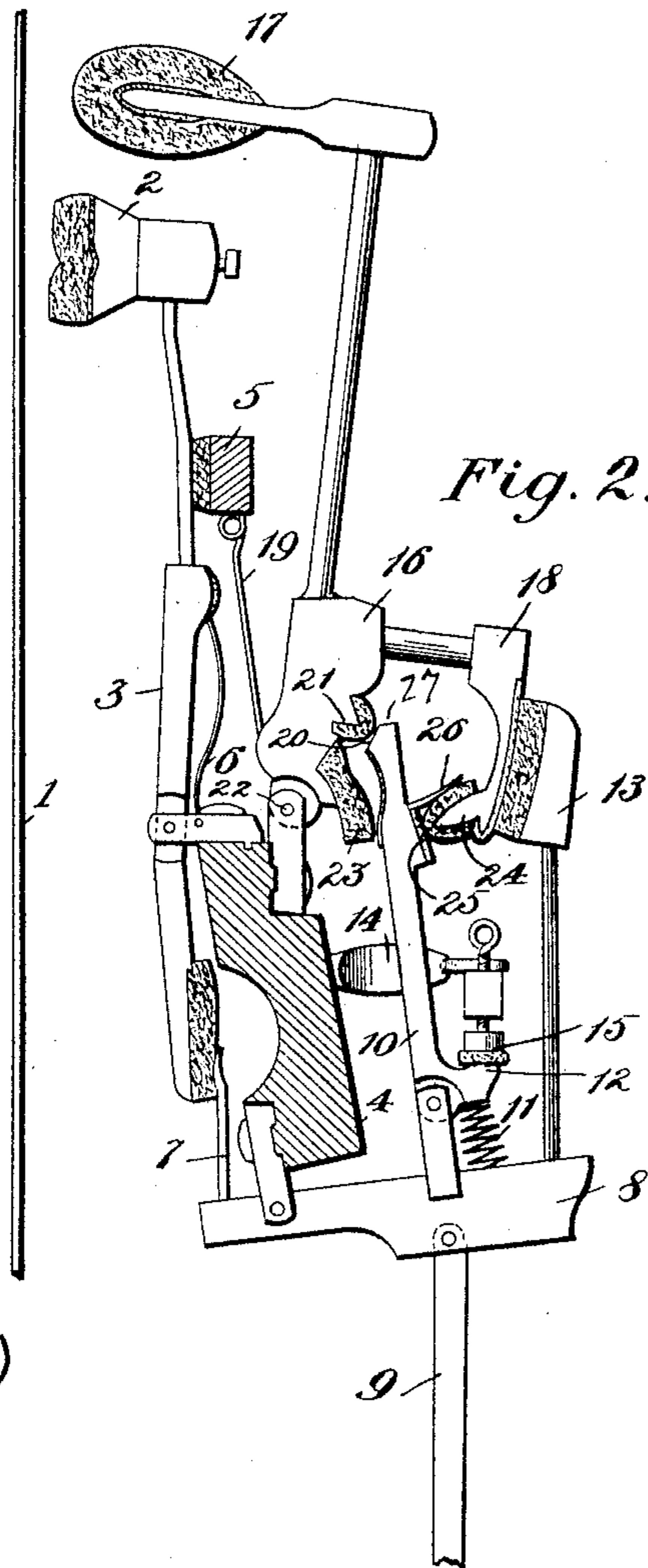
F. L. BECKER.  
UPRIGHT PIANOFORTE ACTION.

No. 587,543.

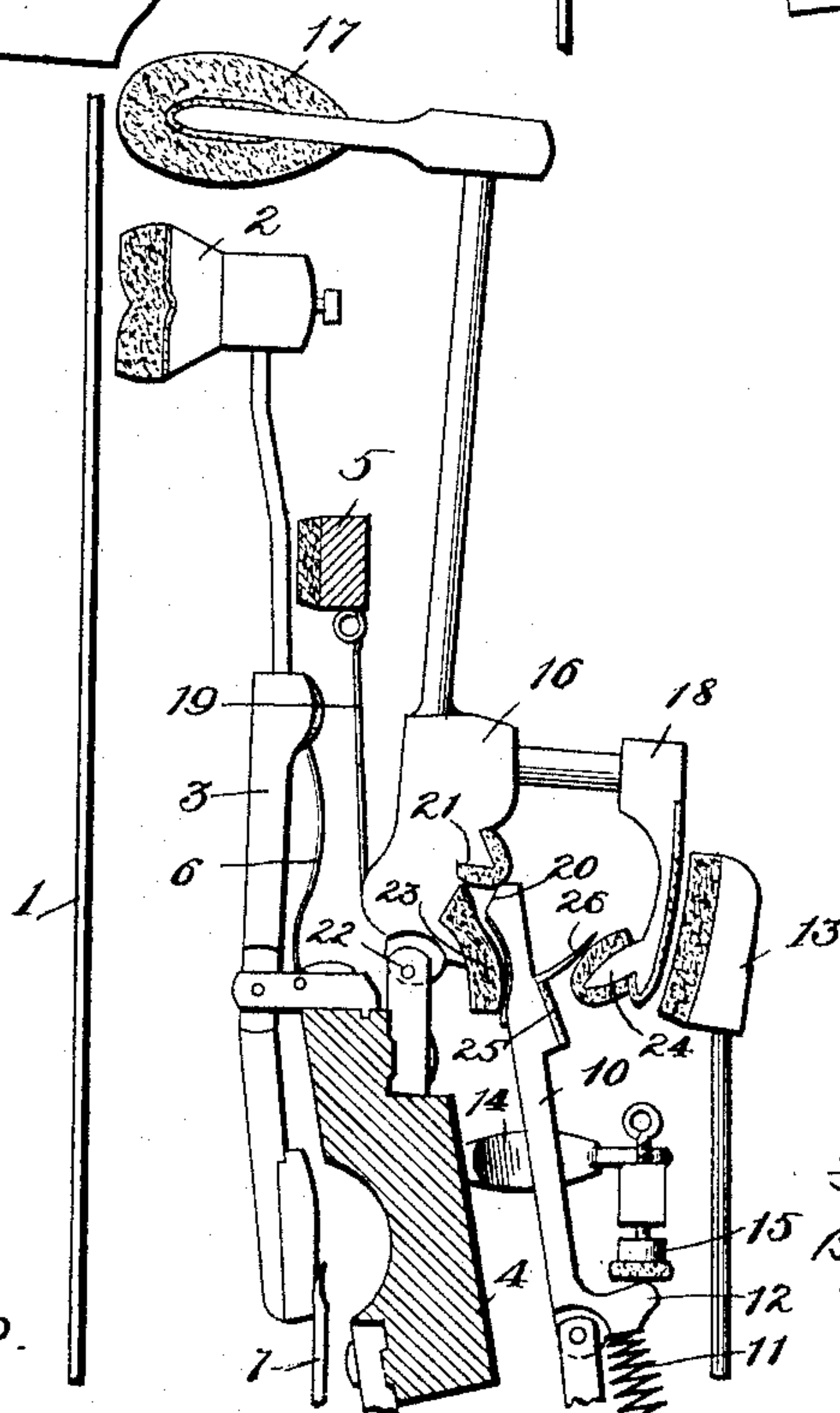
Patented Aug. 3, 1897.



*Fig. 1.*



*Fig. 2.*



Witnesses.  
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# UNITED STATES PATENT OFFICE.

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## UPRIGHT-PIANOFORTE ACTION.

SPECIFICATION forming part of Letters Patent No. 587,543, dated August 3, 1897.

Application filed January 30, 1897. Serial No. 621,297. (No model.)

*To all whom it may concern:*

Be it known that I, FRANCIS L. BECKER, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Upright-Pianoforte Actions, of which the following is a specification.

My invention relates to upright-pianoforte actions, and has for its main object to provide an improved and simplified construction that will permit a very rapid repetition of the stroke of the hammer with a minimum release of the key from the position of a full stroke and to effectually prevent any liability of "blocking," no matter what force may be applied in giving the stroke.

A further object of my invention is to effectually prevent any liability of the jack remaining out of engagement with the lifting-shoulder of the hammer-butt when the key is released, which will frequently occur in other actions when said jack has been abnormally lifted by the swelling of the balance-rail and other parts of the mechanism affected by moisture, producing what is technically termed a "long jack."

A still further object of my invention is to effectually prevent any liability of a broken contact between the end of the jack and the hammer-butt shoulder, which will occur in other actions in dry weather and after the felts in the action have been compressed by use, producing what is technically known as a "short jack."

Still another object is to provide for a positive contact between the back-check and counter-check when the stroke is given that will take place without the rubbing action so injurious to the felt covering these points of contact.

These objects I accomplish in the manner and by the means hereinafter described and claimed, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation of the action in the position of rest, the supporting-rails being shown in section. Fig. 2 is a similar view showing the action at the completion of a stroke, and Fig. 3 a similar view showing the action in the act of moving to a position for repetition with a minimum release of the key.

Similar numerals of reference denote corresponding parts in the several views.

In the said drawings the reference-numeral 1 denotes the piano string or wire, and 2 the damper, carried by the usual damper-lever 3, which is pivoted in any suitable manner upon the main rail 4 of the piano and limited in its movement away from the wire 1 by the usual spring-rail 5. The action of this damper is properly controlled by the spring 6 and spoon 7, carried by the wippen 8, mounted in the usual manner on the under side of the main rail 4, as shown, and operated by the depression of the key-lever (not shown) through the intermediate abstract 9.

Suitably pivoted at its lower end upon the wippen 8 is the jack 10, having the usual jack-spring 11 engaged between its lower projecting heel 12 and the wippen 8, while mounted upon the forward end of the said wippen is the back-check 13. A bracket 14, projecting from the main rail 4, serves as a support for the regulating-rail and button 15, constructed to be vertically adjustable in any suitable manner.

Pivoted in any suitable manner upon the main rail 4 is the hammer-butt 16, carrying the hammer 17 and the counter-check 18. The usual light spring 19 for aiding in retracting the hammer may, if desired, be employed, though, as hereinafter described, its use may be dispensed with.

All of the above-named parts as so far described vary in no essential detail from constructions heretofore in use.

Referring now to the construction of the upper or contact end of the jack 10, it will be seen that the same is formed with a flattened end 27, an inclined face 20, and with a curved felt-covered contact-surface adjacent to the hammer-butt 16. The said hammer-butt is recessed to provide the shoulder 21 for the reception of the end of the jack 10 when the action is in its position of rest, as shown in Fig. 1, it being important to notice also that when the action is in such state of rest the distance between this shoulder 21 and the pivotal point of the jack 10 is greater than that between the pivotal points of said jack and the hammer-butt 16, for a purpose hereinafter to be described. The lower portion of the recess in the hammer-butt is provided with



a cushion 23, that depends a little distance below the bottom of said hammer-butt and performs a function hereinafter described. The surface of the shoulder 21 is of course provided with a cushion, as shown.

The counter-check 18 is provided on its outer surface with a covering to contact with the back-check 13, and its lower end is prolonged inwardly at 24 to engage with an angular contact-surface 25, formed on the jack 10, and with a polished-metal tongue 26, projecting at an angle from the jack 10, the said parts 24 and 25 being felted or cushioned, as shown.

The operation of my improved construction is as follows: The action being at rest in the position shown in Fig. 1, the upper end of the jack 10 is in engagement beneath the shoulder 21 of the hammer-butt, and the projection 24 of the counter-check rests against the contact-surface 25 on the jack, it being noticed that the said hammer-butt is supported entirely by the jack 10, the usual hammer-rail being dispensed with. Now when the key is struck the upward movement of the wippen 8 through the jack 10 throws the hammer 17 against the string 1, the said jack through its escapement mechanism assuming the position with relation to the shoulder 21 of the hammer-butt shown in Fig. 2 and entirely clear of said shoulder, thus permitting the hammer to properly rebound, this movement being also positively applied through the contact of the tongue 26 with the projection 24 of the counter-check. The upward movement of the wippen 8 has also brought backward the back-check 13 into contact with the counter-check 18, and the hammer is thus held firmly against any movement in either direction so long as the key is depressed by this clamping of the counter-check between the back-check and the tongue 26.

The very rapid repetition is obtained as follows: A slight release of the key will be accompanied by a consequent very slight lowering of the jack 10, sufficient to remove its lower projecting end 12 from contact with the let-off button 15. The spring 11 will now cause the upper inclined face 20 of said jack to press against the shoulder 21 and by reason of the fact that the distance between this shoulder 21 and the pivotal point of the jack 10 is greater than that between the pivotal points of said jack and the hammer-butt 16 is obtained than is the case when said point of contact is an equal or less distance from the pivotal point of the jack than is the hammer-butt pivotal point will cause the hammer to move slightly forward again toward the string to the position shown in Fig. 3, it being understood that the lowering of the jack will be accompanied by a movement of the back-check 13 away from the counter-check 18, as shown. This movement of the hammer necessarily raises the shoulder 21 slightly and permits the upper end of the jack to pass beneath said shoulder again, the said move-

ment being shown in Fig. 3 in the act of taking place. It will be noticed in said Fig. 3 that the lower depending end of the cushion 23 contacts with and is slightly compressed by the jack during this movement and acts as a light spring to prevent the complete movement of the hammer 17 against the string 1 during this operation. It will thus be seen that by this reengagement of the jack with the shoulder 21 of the hammer-butt the action is made ready for a repetition by a very slight release of pressure on the key and that it is accomplished by the aid of the jack-spring 11 only. I have shown in the drawings the spring 19 pressing against the hammer-butt to aid in retracting the same, and it has been found that by the above construction even this additional resistance will be readily overcome by the jack in its movement to the repetition position. Moreover, this spring 19 may be entirely dispensed with, as the movements of the hammer are all positively controlled by my improved mechanism, as hereinafter described.

The normal return of the action to its initial position is as follows: When the key is released, the jack drops to its full limit, and at the same time the back-check 13 resumes the position shown in Fig. 1. The downward movement of the jack at the same time through the pressure of the tongue 26 on the projection 24 of the counter-check applies a positive movement to the hammer-butt toward its initial position, and the pressure of said projection 24 on the contact-surface 25 of the jack, as well as the action of the spring 11, causes said jack to resume its initial position beneath the shoulder 21 of the hammer-butt. It will be understood that the relative arrangement of these various parts will be such that all of these movements will positively take place in their proper sequence—as, for example, when the downward movement of the jack from the position shown in Fig. 2 commences the release of the counter-check is at the same instant effected and the movement of the jack toward the hammer-butt begins. All of this time the movement of the hammer away from the string 1 is controlled by the contact between the extension 24 and the contact-surface 25, and the hammer cannot, therefore, assume the position shown in Fig. 1 until the upper flat end of the jack has passed under the shoulder 21.

In devices of this character in upright-piano actions heretofore constructed the reengagement of the jack with the hammer-butt for a repetition stroke has been accomplished by the use of a separate spring, the necessity for which having been due entirely to the fact that the point of contact of the jack with the hammer-butt has been an equal or less distance from the jack pivotal point than is the hammer-butt pivotal point. By locating this point of contact a greater distance from said jack pivotal point than is the hammer-butt pivotal point the increased leverage obtained



renders the hammer-butt responsive to the light pressure of the jack-spring 11 alone, a result which would be impossible with the old constructions. Moreover, in my construction 5 even the breaking or weakening of the jack-spring 11 will not destroy the piano-action, as the operation of the extension 24 and tongue 26 will of themselves cause a positive return of the action to the position shown in Fig. 1, 10 though the repetition action will be, of course, destroyed.

It will be observed, further, that when a stroke is given and the hammer rebounds to the position shown in Fig. 2 the counter-check 15 18 will be met by the back-check 13, and through the simultaneous engagement with the extension 24 thereof of the tongue 26 a most perfect clamp is applied to the hammer, which will effectually prevent any motion of 20 the same in either direction, thus effectually preventing blocking on the string by the rebounding of the hammer from the back-check. The contacting of the extension 24 of the counter-check with the contact-surface 25 of 25 the jack when the hammer rebounds from the string also effectually prevents the rubbing action of the counter-check on the back-check so familiar to those skilled in the art and which is so destructive to the back-check 30 cushion, as the downward movement of the counter-check is thus positively arrested at the moment when it comes in contact with the said back-check.

A still further advantage obtained by locating the shoulder 21 as hereinbefore described 35 is that the hammer-rail may be dispensed with, the hammer-butt being supported in its initial position by the jack. Were this attempted with the point of contact located an equal or less distance from the jack piv- 40 otal point than is the hammer-butt pivot a very slight shrinkage or compression of the parts would cause the hammer to fall so far away from the string as to destroy the repetition until adjusted; but with the point of 45 contact located as hereinbefore described a comparatively great shrinkage or compression may take place without appreciably affecting the distance between the position of rest of 50 the hammer and the string. Moreover, the direct support of the hammer-butt by the jack also completely obviates what is known in the art as a "short jack," as the hammer-butt must of necessity be always in contact with the jack 55 when the action is at rest, no matter what shrinkage or compression has taken place. By dispensing with the hammer-rail it will be readily understood that the action can be much more readily inspected and adjusted. 60 On the other hand, when an action is exposed to moisture, as at the sea-shore, it is frequently rendered useless by what is termed a "long jack," which occurs when the balance-rail and the cushions or felts are expanded to 65 such a degree that the jack is raised when in its normal position, so that it cannot pass un-

der the shoulder on the hammer-butt, or if it does will block the string by causing the hammer to normally contact therewith, thus rendering the piano useless until adjusted. 70 Here again the position of the shoulder 21 as hereinbefore described will cause the position of the hammer with respect to the string to be changed so slightly that the jack will always be able to pass beneath the shoul- 75 der 21 without causing the hammer to approach near enough to the string to affect the stroke or to cause blocking. Moreover, the tongue 26 in its contact with the extension 24 of the counter-check offers a positive bar to 80 any blocking of the string, as hereinbefore described. Further, by reason of the fact that the jack is always in contact with the hammer-butt a full control of the touch is obtained whereby the quantity of the tone 85 may be regulated without employing the soft-pedal attachment, though it is not my intention to dispense with said attachment.

While I have shown and described the upper end of the jack 10 as formed with an inclined face 20 in order to aid the movement 90 of said jack back to its initial position beneath the shoulder 21, I wish it to be distinctly understood that said inclined face may be dispensed with, as the operation of the action 95 will be substantially the same when the end of said jack is perfectly flat.

The jack-block rail commonly employed is also dispensed with in my improved construction, as the extension 24 of the counter-check 100 subserves its functions in every respect with relation to the jack.

So, also, is the use of the ordinary bridle and bridle-wire dispensed with, as the tongue 26 acting on the extension 24 during the re- 105 turn of the jack to its initial position will perform the function thereof and in a more efficient manner.

I wish it to be understood that I do not broadly claim to be the first to obtain a repe- 110 tition in an upright-pianoforte action, but that I accomplish this desideratum by changing and simplifying the construction of the parts heretofore employed, and attaining the same through a return movement of the ham- 115 mer toward the string in a manner substantially similar to that heretofore employed in grand-pianoforte actions and by the power of the jack-spring alone, a result not heretofore accomplished in either grand or upright piano- 120 forte actions.

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

1. In an upright-pianoforte action, the combination with a hammer-butt pivoted on the 125 action-frame, a hammer carried thereby, a jack, means for operating said jack from the key-lever, and escapement mechanism for said jack, of a shoulder located on said 130 hammer-butt at a distance from the pivotal point of the jack greater than the distance



between the hammer-butt pivotal point and said pivotal point of the jack with which said jack contacts to impart its stroke to said hammer-butt and hammer, substantially as set forth.

2. In an upright-pianoforte action, the combination of a hammer-butt pivoted on the action-frame, a hammer carried thereby, a jack, means for operating said jack from the key-lever, a jack-spring for normally pressing said jack against the hammer-butt, escapement mechanism for said jack, and a shoulder located on said hammer-butt at a distance from the pivotal point of the jack greater than the distance between the hammer-butt pivotal point and said pivotal point of the jack with which said jack is adapted to contact, the latter operating to impart the stroke to said hammer through said shoulder and to remain out of contact therewith while the key is depressed, but, when said key is partially released, to move the hammer forward again toward the string through the medium of the jack-spring alone pressing said jack against the hammer-butt, thus permitting the end of said jack to reengage with the shoulder on the hammer-butt in position for a repetition stroke, substantially as set forth.

3. In an upright-pianoforte action, the combination with a hammer-butt pivoted on the action-frame, a hammer carried thereby, a counter-check also carried thereby, a back-check, a jack adapted to normally engage with said hammer-butt, means for operating said back-check and jack from the key-lever, and escapement mechanism for said jack, of a projection carried by said counter-check and adapted to contact with said jack as the key is released to force said jack beneath the hammer-butt shoulder by the weight of the hammer and hammer-butt alone, substantially as set forth.

4. In an upright-pianoforte action, the combination with a hammer-butt pivoted on the action-frame, a hammer carried thereby, a jack, means for operating said jack from the key-lever, a jack-spring for normally pressing said jack against the hammer-butt, and escapement mechanism for said jack, of a shoulder located on said hammer-butt with which said jack is adapted to contact to impart its stroke to said hammer-butt and hammer, and a cushion attached to said hammer-butt beneath said shoulder and depending below the bottom of said hammer-butt against which the jack is adapted to contact when impelled by its spring beneath the shoulder on the hammer-butt and which thereby operates to check the movement of the hammer toward the string, substantially as set forth.

5. In an upright-pianoforte action, the combination with a hammer-butt pivoted on the action-frame, a hammer carried thereby, a counter-check also carried thereby, a back-check, a jack adapted to normally engage with said hammer-butt, means for operating

said back-check and jack from the key-lever, and escapement mechanism for said jack, of a projection carried by said counter-check and adapted to contact with said jack to limit the movement of the hammer in its rebound from the string after its stroke, substantially as set forth.

6. In an upright-pianoforte action, the combination with a hammer-butt pivoted on the action-frame, a hammer carried thereby, a counter-check also carried thereby, a back-check, a jack adapted to normally engage with said hammer-butt, means for operating said back-check and jack from the key-lever, and escapement mechanism for said jack, of a projection carried by said counter-check and adapted to contact with said jack to limit the movement of the hammer in its rebound from the string after its stroke, and a tongue carried by said jack and adapted to engage with said projection to clamp the counter-check against the back-check as the hammer rebounds from the string and to return said hammer to its initial position through said counter-check as the jack descends upon the release of the key-lever, substantially as set forth.

7. In an upright-pianoforte action, the combination of a hammer-butt pivoted on the action-frame, a hammer carried thereby, a counter-check also carried thereby, a back-check, a jack adapted to normally engage with the hammer-butt, means for operating said back-check and jack from the key-lever, escapement mechanism for said jack, a projection carried by said counter-check and adapted to contact with said jack when the action is in its initial position and when the key-lever is depressed, and a tongue carried by said jack and adapted to contact with said projection when the counter-check is against the back-check and as the jack descends to its initial position, the whole operating to impart the stroke to the hammer, to clamp said hammer against movement in either direction while the key is completely depressed, and to return the various parts to their initial positions when the key is released, substantially as set forth.

8. In an upright-pianoforte action, the combination of a hammer-butt pivoted on the action-frame, a hammer carried thereby, a counter-check also carried thereby, a back-check, a jack, means for operating said back-check and jack from the key-lever, a spring for normally pressing said jack against the hammer-butt, escapement mechanism for said jack, a shoulder located on said hammer-butt with which said jack is adapted to contact to impart its stroke to said hammer-butt and hammer, a projection carried by said counter-check and adapted to contact with said jack when the action is in its initial position and when the key-lever is depressed, and a tongue carried by said jack and adapted to contact with said projection when the counter-check is against the back-check and

as the jack descends to its initial position,  
the whole operating to impart the stroke to  
the hammer, to clamp said hammer against  
movement in either direction while the key  
5 is completely depressed, and to return the  
various parts to their initial positions when  
the key is released, substantially as set forth.

In testimony whereof I affix my hand in the  
presence of two witnesses.

FRANCIS L. BECKER.

Witnesses:

LOUIS C. BECKER,  
F. W. BECKER.