No. 666,982. Patented Jan. 29, 1901.

L. N. SOPER.

PIANO ACTION.

(Application filed Sept. 24, 1900.)

(No Model.)

Fig. 1.

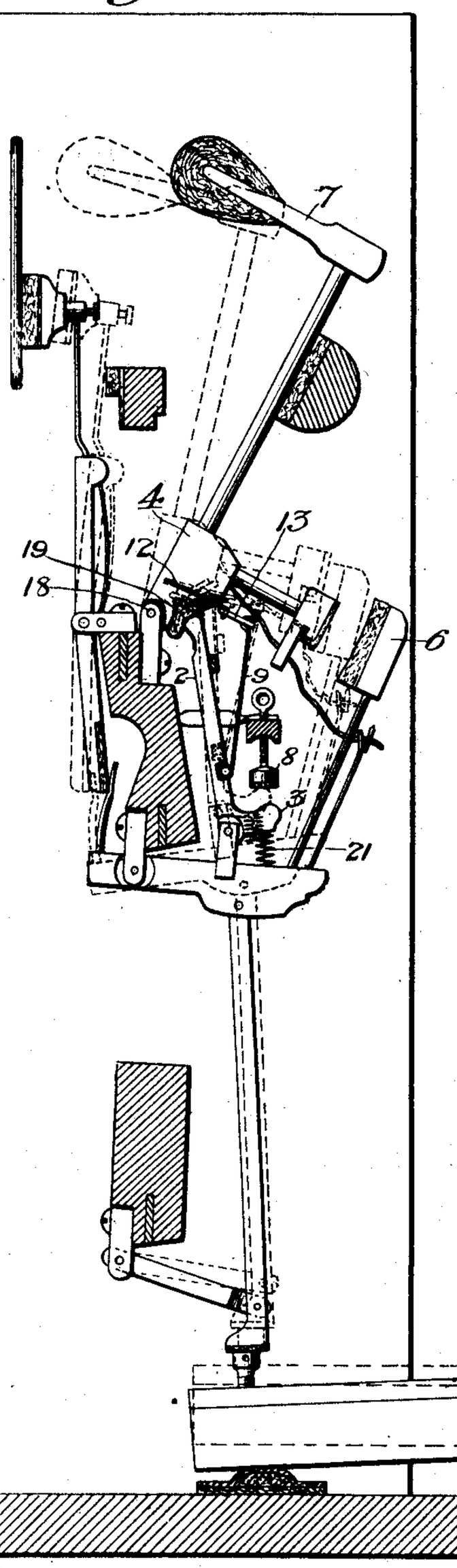


Fig. 2.

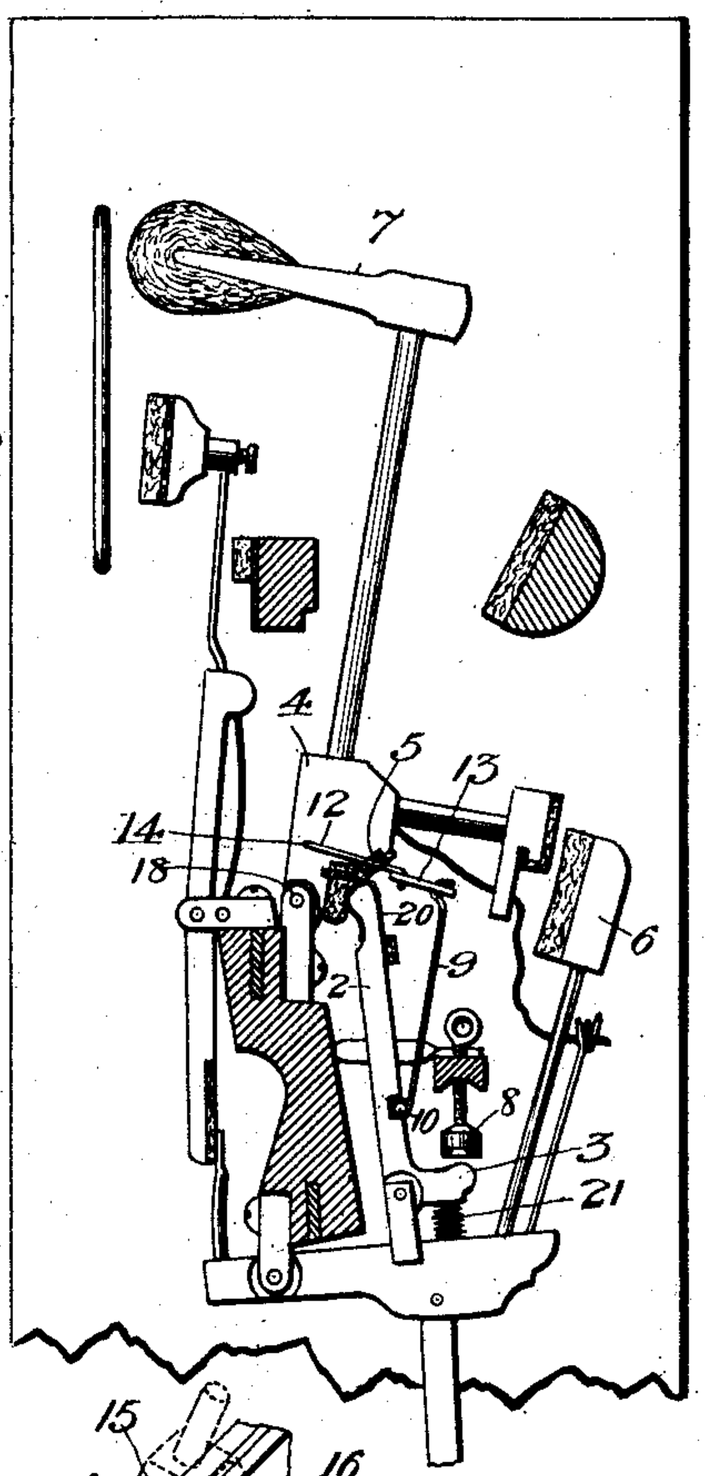
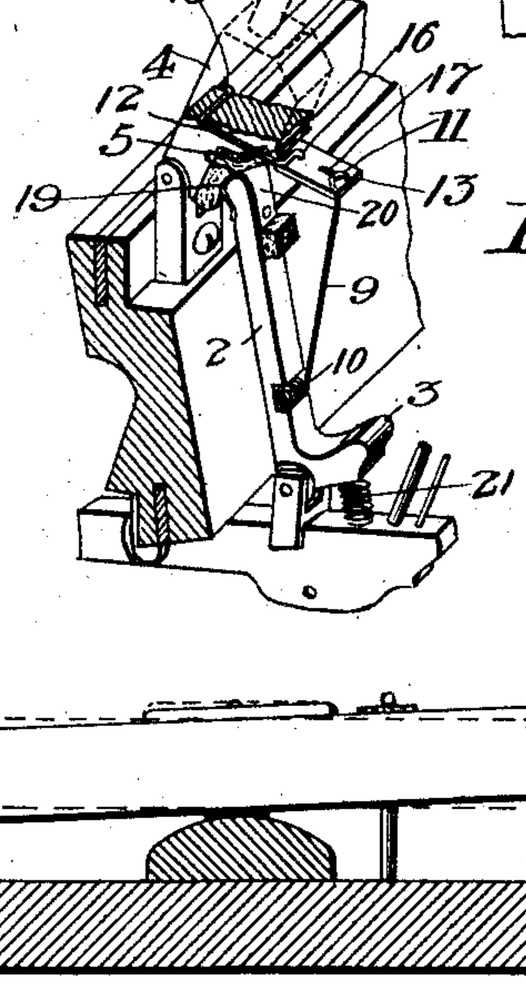


Fig. 3.



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UNITED STATES PATENT OFFICE.

LEWIS NELSON SOPER, OF GUELPH, CANADA.

PIANO-ACTION.

SPECIFICATION forming part of Letters Patent No. 666,982, dated January 29, 1901.

Application filed September 24, 1900. Serial No. 30,962. (No model.)

To all whom it may concern:

Be it known that I, LEWIS NELSON SOPER, a subject of the Queen of Great Britain, residing at Guelph, county of Wellington, in the Province of Ontario and Dominion of Canada, have invented a certain new and useful Piano-Action, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to piano-actions, the object in view being to provide a simple, powerful, and rapid repeating action for upright pianos equal in efficiency to the rapid repeating action of the grand piano.

In order to secure efficiency in rapid repeating actions for upright pianos, the action must not hang on the butt and the jack must be left as free as possible in order to enable it to drop faster than the knuckle, so as to get under the knuckle in position for another stroke. Where the connection between the jack and hammer-butt is above the knuckle, the action will necessarily be slow. By providing the jack with a repeating spring and connecting it with the butt above the axis of the butt there is back pull only on the butt and no down pull and the jack is not suspended in the least. By such arrangement as the key is relieved of pressure the jack is pushed against the knuckle by the repeating spring and the downward movement of the jack is hastened, at the same time lifting or delaying the hammer until the jack gets home, this action being facilitated by reason of the fact that there is no down pull on the hammer-butt. The spring on the jack also constitutes the hammer-spring and renders the pull on the hammer uniform through its entire sweep, which result is accomplished by attaching the repeating-spring connection to the butt near the axis of the latter.

The detailed objects and advantages of the invention will appear more fully in the course of the ensuing description.

The invention consists in a piano-action embodying certain novel features and details of construction and arrangement of parts, as hereinafter fully described, illustrated in the drawings, and incorporated in the claims.

In the accompanying drawings, Figure 1 is a vertical section through an upright piano, illustrating in side elevation the construction and arrangement of the improved action, the initial position of the parts being represented in full lines, while the dotted lines illustrate the position which the parts assume after the key has been depressed. Fig. 2 is a similar view showing the position which the parts assume after the key has been slightly or only partially released. Fig. 3 is a detail perspective view showing the form of connection between the jack and hammer-butt.

Similar numerals of reference designate corresponding parts in the several figures of the drawings.

The invention relates particularly to a novel combination existing between the hammer-butt, jack, and repeating spring and the particular connection between the free end of the repeating spring and the hammer-butt.

In the drawings, 1 designates the key, 2 the jack, 3 the toe of the jack, 4 the hammer-butt, 5 the knuckle, 6 the back-check, 7 the hammer, and 8 the regulating-button, the said parts being of the ordinary construction and arrangement, such as is at present found in upright-piano actions.

9 designates the repeating spring, which also constitutes the hammer-spring. This spring is provided at or near one end with a coil 10 and is attached at the same end to the jack at a point intermediate the height of the latter, while the free end of said spring is hooked, as indicated at 11, for attachment to the connection which unites it with the hammer-butt. The connecting medium may be flexible throughout, but is preferably composed of a wire link 12 and a flexible link 13, of leather, cloth, or other suitable material. In applying the flexible connection a hole 14 is drilled transversely through the butt 4, close to and above its axis, to receive one end of the wire 12, which passes therethrough, as shown in Fig. 3, and has its extremity deflected, as shown at 15, to prevent its escape. The main body of the wire link 12 extends along one side of the butt and parallel thereto, and after reaching back of the butt it is bent to extend transversely behind the butt and half-way across the same, where it is formed with a hook 16, which enters an opening in the flexible link member 13, the latter being

provided with a second opening 17, in which the hook 11 of the jack-spring 9 is received. Experiment has demonstrated the fact that the hole 14, where the link 12 attaches to the hammer-butt, should be seven-sixteenths of an inch above the axis 18 of the knuckle, in order to obtain the best results, to secure a back pull on the butt and obviate a down pull thereon. By employing wire in constructing the link 12 and bending one end thereof so as to bring the hook 16 centrally behind the hammer-butt the repeating spring draws evenly on the butt, thus avoiding any lateral tension on the butt, which would cause it to twist and bind on its journal. It will be seen that the point of connection of the link 12 with the butt is directly above the axis or journal of the butt, thus insuring a straight back pull without down pull and obtaining a practical rapid repeating effect and result which would be impossible were the connection made directly at the back of the butt instead of over the butt-journal. The inner corner of the jack is also chamfered off to leave a flat face 19, extending for about one-eighth of an inch and disposed parallel to the knuckle when at check. In order to give the usual and requisite bearing on the knuckle, the wood of the knuckle should be cut away about one-sixteenth of an inch additional under the jack-cushion.

Another feature of the invention consists in providing the jack with a metal cap 20, preferably of thin brass and bent around the butt-engaging portion of the jack and downward on opposite sides thereof. This has the effect of making the action much smoother in operation, does away with considerable friction, and as a result enables the more important elements of action to last twenty-five to fifty per cent. longer. This smoothness in operation also contributes largely to the rapid repeating results and is a direct outcome of the construction and relation of the parts as above set forth.

In addition to the jack or repeating spring 9 a toe-spring 21 is placed beneath the toe 3 of the jack to assist in returning the jack to its seat against the knuckle.

The operation is as follows: When the key is struck, the hammer after striking the wire comes back to check in the usual way. The repeating spring, which extends slightly above the jack, through the medium of the flexible connection exerts a back pull on the butt, but no down pull. The key is now slightly released, whereupon the toe and repeating springs press the jack against the knuckle, and this pressure being in excess of the back pull on the butt causes the hammer to be tipped forward toward the wire until the jack is reseated, whereupon the jack is ready for another stroke before the toe is clear of the regulating-button.

The action combines simplicity, rapidity, and power, and in addition thereto it works with great smoothness and absence of friction. It has no special or delicate parts in order to secure the repeating action and there is nothing to require special regulating and proving section by section in order to know that it will repeat. This is an important item when it is considered that there are eighty-eight sections in a seven and one-quarter octave action. Rapid repeating depends in part on the quick reseating of the jack, and this, it will be apparent, is accomplished by the mechanism above described. In rapid playing the hammer is not tipped forward as described, but rebounds unchecked, hastens the movement of the jack, and largely reduces the friction and accelerates the movement.

Having thus described the invention, what is claimed as new, and desired to be secured by Letters Patent, is—

1. In an upright-piano action, the combination with a hammer-butt and jack, and a spring on the jack, of a flexible connection between the spring and butt, consisting of a wire link extending parallel to and on one side of the butt with one end inserted through the butt at a point above the fulcrum of the butt and its other end bent to extend behind the butt, and a flexible link connecting the wire link with the jack-spring, substantially as described.

2. In an upright-piano action, the combination with a hammer-butt, jack, and jack-spring, of a flexible connection between the butt and spring, consisting of a wire link extending parallel to one side of the butt and having one end bent and extended transversely through the butt with its extremity deflected to prevent displacement, the other end of the wire link being bent transversely to extend behind the butt and a flexible link connecting the back end of the wire link with the free end of the jack-spring, substantially as described.

3. In an upright-piano action, the combination with a hammer-butt, jack, and jack-spring, of a connection between the hammer-butt and jack-spring comprising a wire member connecting with the butt and a flexible member of leather or similar material connecting with the jack-spring, substantially as described.

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

LEWIS NELSON SOPER.

Witnesses:
WILLIAM MCASTOCKER,
HUGH MCMILLAN.