

No. 658,134.

Patented Sept. 18, 1900.

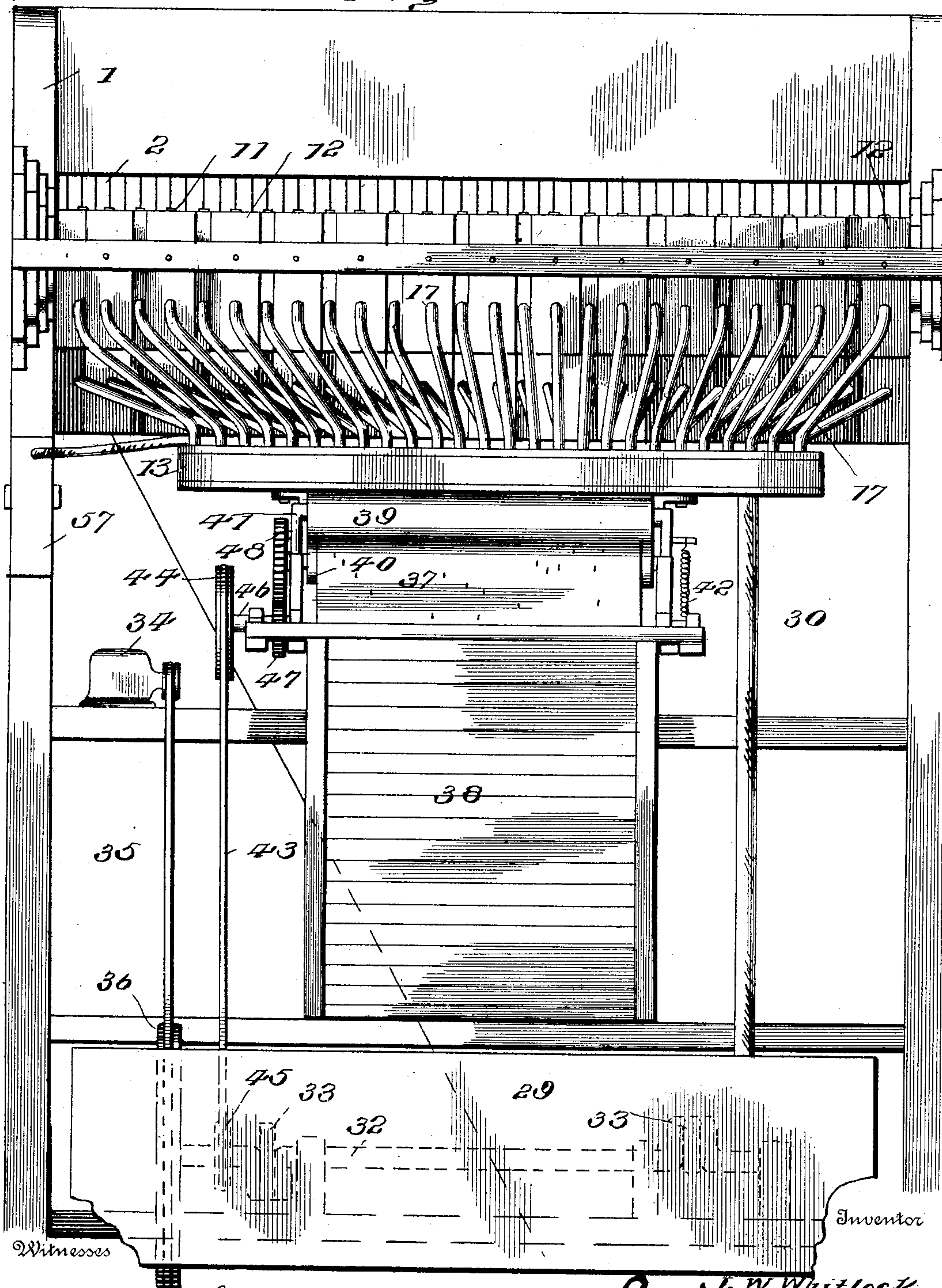
J. W. WHITLOCK.
SELF PLAYING MUSICAL INSTRUMENT.

(Application filed Sept. 16, 1899.)

(No Model.)

3 Sheets—Sheet 1.

Fig. 1.



Gladys D. Thompson.
Gerrard Matthews.

J. W. Whitlock
by R. H. Lacey, Attorneys

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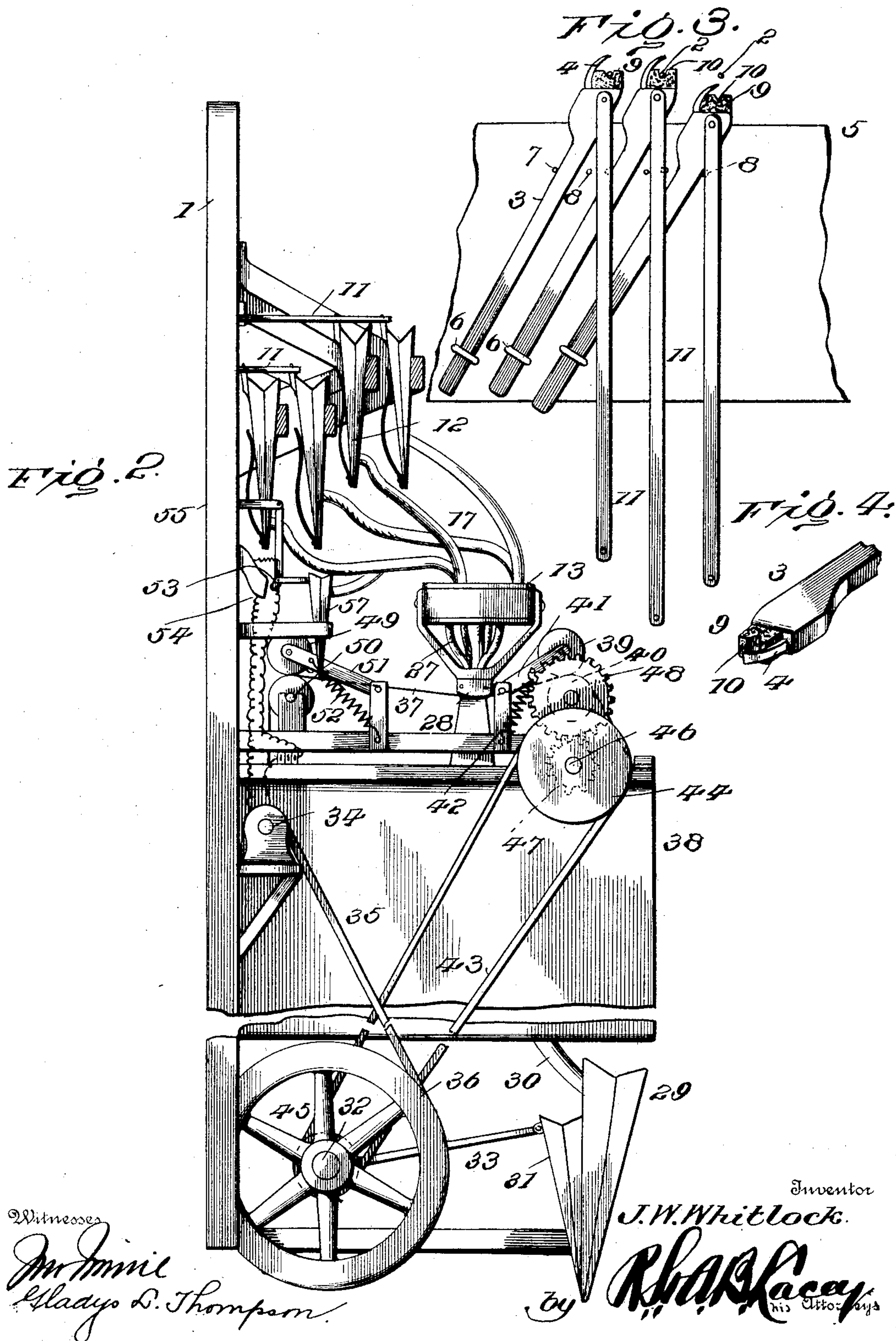
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3 Sheets—Sheet 2.



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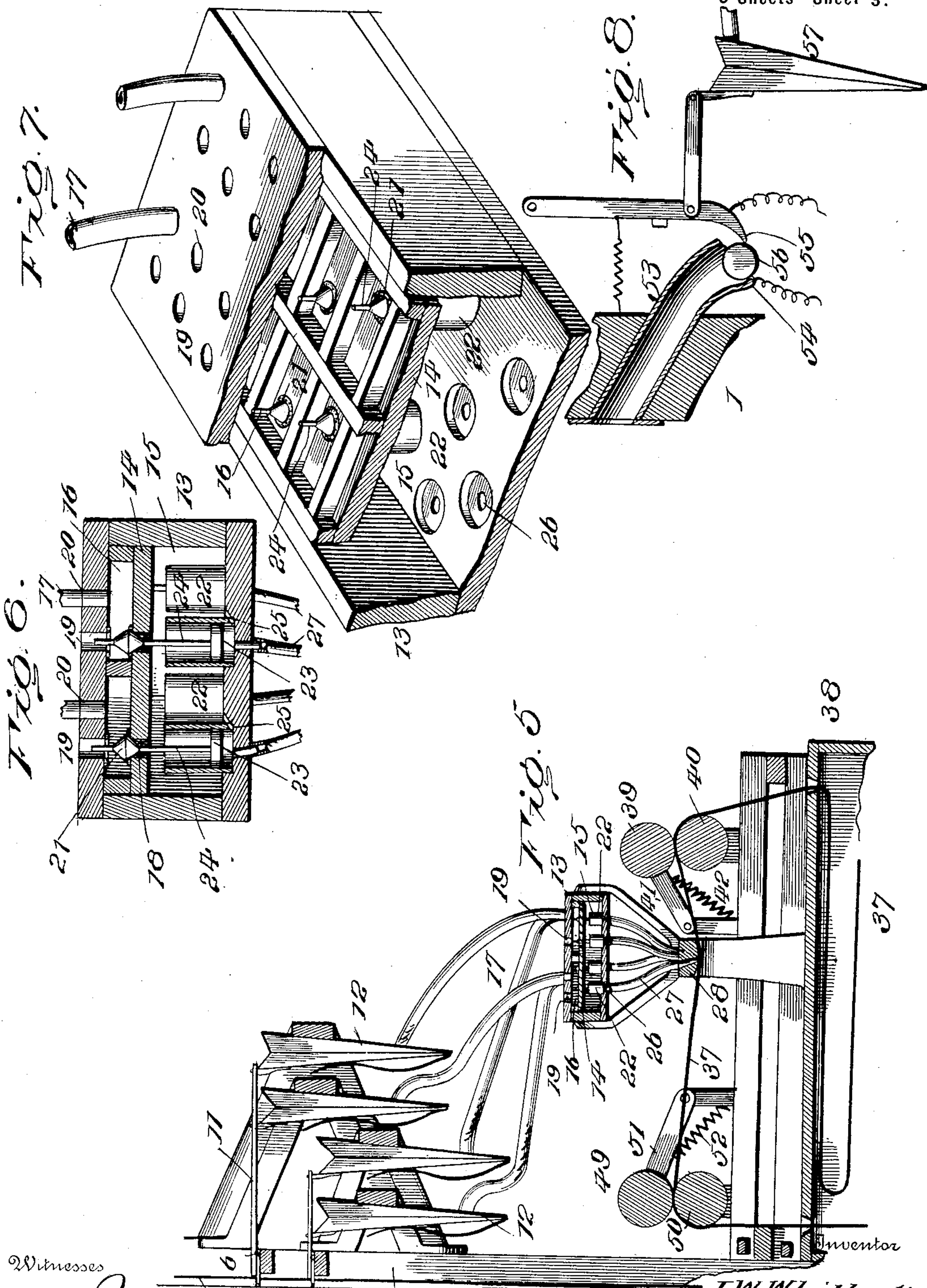
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(No Model.)

3 Sheets—Sheet 3.



Witnesses

Mr. Isaac Gladys L. Thompson

J. W. Whitlock
by *R. H. Blaney* his Attorney

UNITED STATES PATENT OFFICE.

JOHN W. WHITLOCK, OF RISING SUN, INDIANA.

SELF-PLAYING MUSICAL INSTRUMENT.

SPECIFICATION forming part of Letters Patent No. 658,134, dated September 18, 1900.

Application filed September 16, 1899 Serial No. 730,761. (No model.)

To all whom it may concern:

Be it known that I, JOHN W. WHITLOCK, a citizen of the United States, residing at Rising Sun, in the county of Ohio and State of Indiana, have invented certain new and useful Improvements in Self-Playing Musical Instruments; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to musical instruments which are automatic in their action, starting upon the introduction of a coin of denominated value into a slot or passage and stopping automatically when the piece is finished.

The particular class of musical instruments embraced within the purview of this invention is stringed, and the vital feature of the invention resides in the action mechanism for sounding the strings, said action mechanism comprising pickers and actuating mechanism for the pickers.

The pickers may be applied to any nature of stringed instrument by slight changes and modifications to adapt them to the particular location, pattern, and make of instrument, and they may be operated mechanically in any way and by any means, depending upon the size and character of instrument to be mechanically played.

The style of instrument for which the action is designed is of the harp type, the strings varying in length and diameter or gage, one string for each note, and attached to a frame approximating the harp outline as nearly as practicable and chromatically tuned.

The actuating mechanism is of the pneumatic type and comprises a tracker-bar, perforated note or music sheet, feeding mechanism therefor, vacuum and suction bellows, pneumatic-action, and motor-bellows.

The chief object of the invention is the provision of a picker mechanism which will be quick in action, responsive to its actuating mechanism, effective in operation, and not liable to derangement.

A further purpose of the invention is to devise a mechanism of the character aforesaid which will be compact, reliable and effective, and accessible for inspection and repairs.

For a full description of the invention and the merits thereof, and also to acquire a knowledge of the details of construction of the means for effecting the result, reference is to be had to the following description and the drawings hereto attached.

While the essential and characteristic features of the invention are necessarily susceptible of modification, still the preferred embodiment of the invention is illustrated in the accompanying drawings, in which—

Figure 1 is a rear view of the vitals of the instrument. Fig. 2 is a side elevation, partly in section. Fig. 3 is a plan view of a series of pickers. Fig. 4 is a detail perspective view of the end portion of a picker. Fig. 5 is a section of the feeding mechanism for the music or note strip, the action, and the supports for the pickers and their actuating mechanism. Fig. 6 is a section of the action-case. Fig. 7 is a sectional perspective view of the action-case. Fig. 8 is a detail view of the circuit-closing mechanism.

Corresponding and like parts are referred to in the following description and indicated in all the views of the drawings by the same reference characters.

It is to be understood that the frame bearing the musical strings and the action are in practice suitably incased to protect them from dust and interference, the casing being omitted from the drawings for the sake of simplicity and in order to show more clearly the relative arrangement of the parts comprising the action.

The frame 1, upon which the musical strings 2 are strung, may be of metal or wood or a combination of the two, the ordinary frets and bridges being employed wherever feasible in order to secure the best results in quality and character of tone. The pins and agraffes will approximate in arrangement the outline of a harp as nearly as practicable, because in the preferred form of the instrument the strings will be mounted and strung after the fashion of the method of stringing a harp.

The pickers, one for each string, consist, essentially, of bars 3 and hooks or pickers 4, secured to the outer ends of the bars 3 and having their projecting ends curved and disposed to project across the path of the musical strings, whereby in the operation of the

pickers said strings will be sounded. Inas-
much as the series of pickers are constructed
exactly alike, a detailed description of one
only will be given. The bar 3 is obliquely
5 disposed and is supported upon a ledge or
shelf 5, and its inner end passes loosely
through a keeper 6 and its forward end plays
between stops 7 and 8, spaced apart a greater
distance than the lateral extent of the bar.
10 A damper 9 is applied to the forward end of
the bar 3 and may consist of a piece of felt,
chamois, or like material commonly employed
in musical instruments for producing a damp-
ing effect of the strings when sounded. A
15 notch 10 of approximately V form is provided
in the outer side of the damper 9 and forms
a seat for the musical string and prevents
said damper producing an appreciable thud
or sound when coming in contact with the
20 string after the latter has been sounded by
the picker. The picker 4 consists of a metal
pin, preferably of steel, let into the bar 3 and
having its projecting end flattened and
curved, the bill portion of the picker over-
25 hanging the damper 9 and projecting across
the path of the string to be sounded thereby.
A rod 11 connects the outer end of the bar 3
with the motor-bellows 12, provided for op-
erating the picker in the operation of the in-
30 strument.

A motor-bellows will be provided for each
picker and the series of bellows are arranged
in rows and sets, the rows of the sets alter-
nating in order to secure compactness of ar-
35 rangement. One set of bellows will be dis-
posed in a relatively-higher plane than the
other, this being necessary in order to econo-
mize space and locate the bellows to the best
possible advantage with reference to the size
40 of the cabinet and the location of the pickers.
The motor-bellows are normally expanded
and are collapsed by exhausting the air there-
from by means of the pneumatic-action in
the manner presently to be described. The
45 movement of the motor-bellows imparts a re-
ciprocating motion to the rods 11 and the
latter in turn move the bars 3. In the nor-
mal position of the pickers the bars 3 bear
against the pins 7 and the dampers against
50 the musical strings. When the motor-bel-
lows is collapsed, the rod 11, connected there-
with, moves inward and brings the bar 3
against the pin 8 and causes the hooked end
of the picker 4 to come in contact with the
55 musical string and sound the latter. As the
motor-bellows expands, the rod 11 will move
outward and bring the bar 3 into contact with
the pin 7, thereby causing the picker to clear
the musical string on its return stroke, which
60 is necessary in order not to sound the note
on the forward or return stroke of the picker.
The relatively-lateral play of the bar 3 at its
outer end results in throwing the picker into
and out of the path of the string, whereby
65 upon the instroke of the picker it will come
in contact with the string and upon the out-
stroke it will clear said string.

The action-case 13 is an elongated box sub-
divided horizontally by means of a partition
14 into longitudinal chambers, one of which 70
constitutes an exhaust-chest 15 and the other
being subdivided to form a series of valve-
chambers 16, each being in communication
with a certain motor-bellows by means of a
tube 17. There will be as many valve-cham- 75
bers 16 as there are motor-bellows, and each
will be in valved communication with the ex-
haust-chest 15 by means of an opening 18,
formed in the partition 14. Each valve-
chamber will be provided with two openings 80
or ports 19 and 20, formed in the top plate or
side of the action-case, the openings 19 hav-
ing free communication with the external air
and the openings 20 being in communication
with the motor-bellows by means of the tubes 85
17. The openings 19 and 18 are in alinement
and are provided at their inner ends with
valve-seats against which valves 21 are adapt-
ed to alternately close, said valves being 90
double ended and having each end of conical
form, whereby they are self centering and
seating, so as to thoroughly and effectively
close the respective openings 18 and 19 ac-
cording to their position.

The primaries located in the exhaust-chest 95
and coöperating with the valves 21 consist,
essentially, of cylinders 22 and plungers 23,
the latter being connected with the stems 24
of the valves 21 in such a manner as to admit
of the valves having a relatively-lateral move- 100
ment to compensate for any variation in
alinement of the openings 19 and 18 and the
cylinders 22, thereby obviating binding,
which would result if the parts were rigidly
connected and said openings and cylinders 105
were out of alinement. Vents 25 are formed
in the bottom piece or closure of the action-
case and establish communication between
the inner ends of the cylinders 22 and the ex-
haust-chest. The cylinders 22 are let into 110
seats formed in the top side of the lower piece
of the action-case and may be of any desired
material found best suited to answer the pur-
pose. Nipples or short tubes 26 extend from
the lower ends of the cylinders 22 through 115
the bottom side of the action-case and are
connected by tubes 27 with the openings
formed in the tracker-bar 28.

The exhaust-chest 15 is normally main-
tained under tension by withdrawing the air 120
therefrom when the instrument is playing
and the valves 21 are normally seated and
close the openings 18. Upon disturbing the
equilibrium upon the opposite sides of any
one of the primaries, as by uncovering the 125
opening in the tracker-bar in communica-
tion with said primary, the plunger 23, cor-
responding with said primary, will move up-
ward and cause the valve connected there-
with to close the opening 19 and uncover the 130
opening 18, thereby establishing communi-
cation between the motor-bellows and the
valve-chamber corresponding with the valve
operated, whereby the air will be sucked from

said motor-bellows and the latter will collapse and cause a forward movement of the picker in the manner presently described. The instant the opening in the tracker-bar is covered the air will be withdrawn from the inner end of the cylinder through vents 25, and the plunger, previously moved upward, will return to a normal position and cause the valve attached thereto to move and uncover the opening 19 and close the opening 18 and establish communication between the motor-bellows and the external air through the tube 17, valve-chamber, and opening 19, as will be readily comprehended. As the motor-bellows expands it will return the picker to a normal position, to be again actuated when the conditions just described are brought about by uncovering the opening or openings in the tracker-bar, which is effected by means of a perforated music or note sheet.

The air is withdrawn from the chest 15 by means of any convenient mechanism, and, as shown, a vacuum-bellows 29 is provided and is connected by means of a pipe 30 with the action-case and leads into the chest 15. This vacuum-bellows 29 is of the type expanded by means of suitably-disposed springs. A pair of suction-bellows 31 is disposed for joint service in connection with the vacuum-bellows and have valved communication therewith and are alternately actuated, so as to exhaust the air from the bellows 29, which constitutes an exhaust-reservoir for the chest 15 to maintain the latter in a state of tension when the instrument is playing. The suction-bellows 31 are alternately actuated, preferably by means of a power-driven crank-shaft 32, having its crank portions oppositely disposed and connected by pitmen 33 with the respective bellows 31. The shaft 32 may be driven from any suitable source of power, and in the present instance an electric motor is provided and is located within the cabinet enclosing the action mechanism. A drive-belt 35 connects the motor 34 with a pulley 36, applied to the shaft 32, and transmits motion thereto.

As previously stated, the openings in the tracker-bar 28 are uncovered by means of perforation in the music or note sheet 37, which is drawn past the tracker-bar in the ordinary manner and which is of the endless type. The surplus portion of the music or note sheet is received in a box 38, located below the tracker-bar. The feeding mechanism for the music or note sheet consists of drawing-rollers 39 and 40, between which said sheet passes, the roller 40 being mounted in fixed bearings and the roller 39 in movable bearings consisting, essentially, of a swinging frame 41. A tension-spring 42 coöperates with the swinging frame 41 to hold the roller 39 in contact with the roller 40 with sufficient pressure to insure the positive movement of the music-sheet between the two rollers when the latter are rotated. Motion is imparted to one of the rollers, as 40, from a power-driven

shaft 32 by means of a drive-belt 43, which passes around pulleys 44 and 45, the latter applied to the shaft 32 and the former to a shaft 46, having a pinion 47 in mesh with a gear-wheel 48, applied to the outer end of the journal of the roller 40. The provision of the pulleys 44 and 45 enables the rollers 39 and 40 to move at any relative speed, so that the piece may be played fast or slow, as desired. The feeding mechanism is located at one side of the tracker-bar and a direction mechanism is located at the opposite side and consists of companion rollers 49 and 50, the latter being mounted in fixed bearing and the former journaled to a swinging frame 51, to which a tension-spring 52 is applied, so as to hold the roller 49 in intimate contact with the roller 50, whereby the music-sheet, passing between the rollers 49 and 50, is not permitted to move forward too rapidly and is normally maintained under tension between the direction and the feeding mechanisms.

When the instrument is playing, the feeding mechanism is operated and draws the music-sheet past the tracker-bar, and the perforations in said sheet corresponding to the notes effect an operation of the pneumatic-action in the manner herein described, whereby the musical strings are sounded and produce the effect of the composition.

A coin-passage 53 communicates with a slot formed in a side of the cabinet and leads within the latter and is provided at its inner end with electric contacts 54 and 55, the former being fixed and the latter movable and both constituting the terminals of an electric circuit, including the motor 34 therein. When a coin 56 of denominate value determined upon to operate the machine is introduced into the passage 53 and passes through to the inner end thereof, it is caught between the contacts 54 and 55 and closes the circuit, thereby setting the machine into motion and playing the piece provided upon the note-sheet 37. At the finish of the piece the contact 55 is moved and releases the coin 56, which drops into a suitably-placed receptacle, thereby interrupting the circuit and causing the instrument to cease playing. A motor-bellows 57 is connected with the movable contact 55 and normally holds the latter in position to arrest the forward movement of the coin 56 in conjunction with the contact 54 and is likewise connected by means of a tube 58 with a valve-chamber 16 of the action-case, the note-sheet being provided with an opening to register with an opening in the tracker-bar, whereby when the instrument has completed the playing of the piece the motor-bellows 57 will be actuated and release the coin 56 and effect a stopping of the machine in the manner stated.

From the foregoing it will be seen that the machine is entirely automatic in its action, being started by the introduction of a coin of predetermined value into the coin-passage 53 and stopping when the piece is finished, the

parts being disposed to the best possible advantage, so as to economize space and effect a saving in the length of the tubes necessary to connect the action-case with the tracker-bar and respective motor-bellows. The pickers resting upon the ledges or supporting-shelves 5 are readily accessible for repairs or substitution when necessary to replace a disabled one by a new one.

10 Having thus described the invention, what is claimed as new is—

1. In self-playing musical instruments, the combination with the musical strings, of pickers comprising bars having points to come in contact with the strings, dampers applied to the bars, and actuating mechanism for the pickers, substantially as described.

2. In self-playing musical instruments, the combination with the musical strings, of pickers comprising bars provided with points to come in contact with said strings, dampers applied to the bars and having notches to receive the strings, and actuating mechanism for the pickers, substantially as specified.

25 3. In self-playing musical instruments, comprising musical strings, the combination of bars provided with picker-points having their projecting ends curved, and dampers applied to the said bars and having the curved bills of the picker-points overlapping the said dampers, substantially as set forth.

4. In self-playing musical instruments, comprising musical strings, the combination of an obliquely-disposed bar mounted to receive a combined pivotal and sliding movement at one end and a combined lateral and longitudinal movement at its opposite end which is provided with a picker-point, a pair of spaced stops for the picker-bar to move 35 longitudinally and laterally between, and actuating means connected to the picker end of the picker-bar and adapted to travel in a line forming an acute angle therewith, substantially as set forth.

45 5. In self-playing musical instruments hav-

ing musical strings, an obliquely-disposed bar provided at one end with a picker-point, a keeper at one end of said bar, spaced stops at the opposite end of said bar and limiting the same in its lateral movements, and actuating 50 mechanism for reciprocating the picker-bar, as and for the purpose set forth.

6. In self-playing musical instruments having musical strings, the combination of obliquely-disposed bars adapted to move longitudinally and having a limited lateral play 55 and provided at the ends adjacent to the musical strings with picker-points, rods connected with the ends of the bars carrying the picker-points, and actuating mechanism for 60 imparting a rectilinear movement to said rods, as and for the purpose set forth.

7. In self-playing musical instruments, the combination with the operating mechanism for producing the musical notes and including motor-bellows, of an action-case having seats upon the inner face of a side and openings extending outward from the seats, said case being subdivided into an exhaust-chest and a series of valve-chambers, the latter having communication with the respective motor-bellows, cylinders secured in the seats and having vent-openings in communication with plungers operating in the cylinders, stems projected from the plungers and entering 75 alined openings in opposite walls of the valve-chambers, double conical-ended valves connected with the stems between their ends and cooperating with alined openings leading from the respective valve-chambers into the exhaust-chest and the open air, and means 80 for creating a tension in the exhaust-chest by sucking the air therefrom, substantially as described.

In testimony whereof I affix my signature 85 in presence of two witnesses.

JOHN W. WHITLOCK.

Witnesses:

V. B. HILLYARD,
C. C. HINES.