

1,000,359.

3 SHEETS--SHEET 1.



W. P. Burke
A. F. Neuman

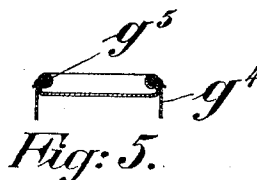
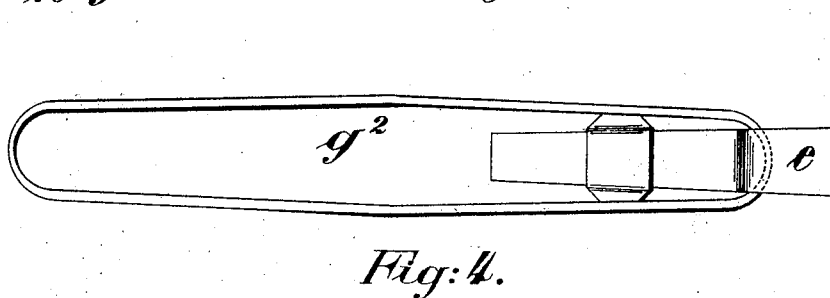
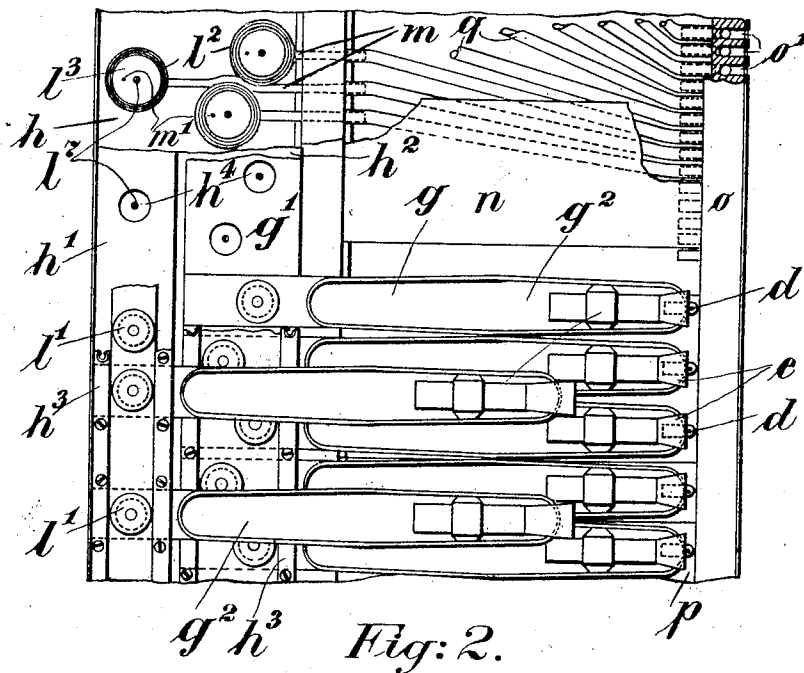
Claude William Atkinson
BY *J. M. McLean* *Att'y.*

C. W. ATKINSON.
PIANO PLAYING MECHANISM.
APPLICATION FILED JAN. 14, 1910.

1,000,359.

Patented Aug. 15, 1911.

3 SHEETS-SHEET 2.



WITNESSES

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INVENTOR

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Patented Aug. 15, 1911.
3 SHEETS—SHEET 3.

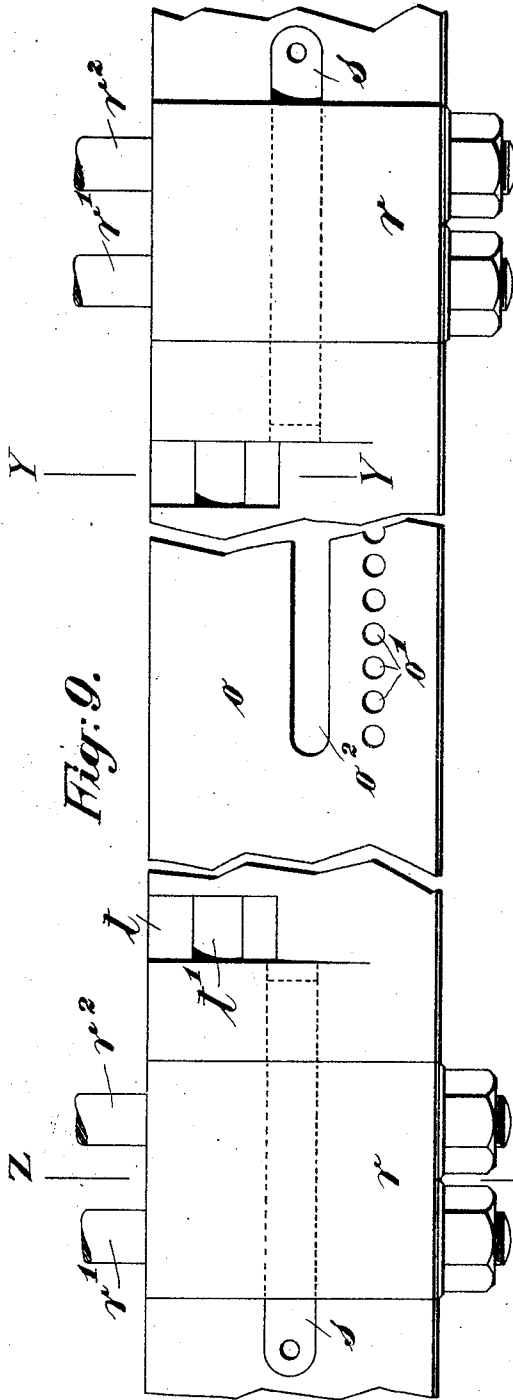


Fig. 9.

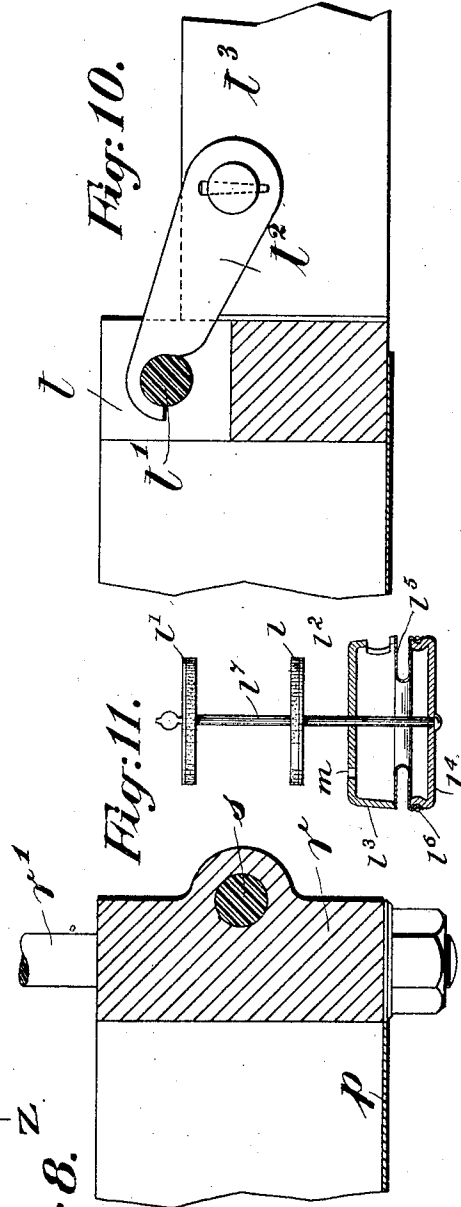


Fig. 8.

Fig. 10.

Fig. 11.

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UNITED STATES PATENT OFFICE.

CLAUDE WILLIAM ATKINSON, OF GREAT MISSENDEN, ENGLAND.

PIANO-PLAYING MECHANISM.

1,000,359.

Specification of Letters Patent. Patented Aug. 15, 1911.

Application filed January 14, 1910. Serial No. 538,009.

To all whom it may concern:

Be it known that I, CLAUDE WILLIAM ATKINSON, a subject of the King of Great Britain and Ireland, residing at Great Mis-
senden, in the county of Bucks, England,
have invented new and useful Improve-
ments in and Relating to Piano-Playing
Mechanism and the Like, of which the fol-
lowing is a specification.

10 This invention relates to piano playing
mechanism and the like, and has for its ob-
ject the construction and arrangement of
pneumatic operating mechanism whereby
(1) simplicity, low cost of manufacture and
15 compactness of installation are obtained (2)
metal or other impervious material can be
used in place of wood and (3) the pneumatic
valve mechanism is a completely self con-
tained element so as to be readily inserted
20 into and held in position in a vacuum chest
without any special form of support and
forming a jointed connection which is air
tight under ordinary circumstances.

In the manufacture of piano players up
25 to the present the mechanism involved has
required the enlargement of the piano case
when applied within the same or the pro-
vision of a separate cabinet containing the
operative mechanism which is placed in
30 front of the ordinary piano. In the first
case an ordinary piano cannot have the
mechanism fitted thereto and in the second
place the provision of the mechanism in a
cabinet produces a piece of furniture which
35 is heavy and difficult to place in position,
and when not in use is a cumbersome ob-
struction in an ordinary room. Further the
mechanism which is built into the piano
case, where it operates the keys at the rear
40 end by an upward push, in this way dis-
turbs the initial balance of the key mecha-
nism as designed for playing with the hands.
It has been customary in the past to manu-
facture this class of mechanism from wood
45 owing no doubt to the fact that the manu-
facture has been in the hands of piano and
organ makers. Wood is owing to its po-
rosity the most unsuitable material and some
treatment in the way of varnishing has to
50 be carried out to reduce the leakage through
the material itself. In addition the bulk
of material necessary in order to obtain rigid-
ity and strength, must necessarily be con-
siderable, with corresponding bulk and
55 weight. It is to overcome these objections
that this invention is designed.

This invention consists in the general ar-
rangements and construction by which the
above objects are effected.

In order that my invention may be the
better understood, I will now describe the
same in relation to the accompanying draw-
ings, reference being had to the letters and
figures marked thereon.

Like letters refer to like parts in the va-
rious figures.

Figure 1 is a sectional elevation of the vacu-
um chamber and portable playing table, and
pneumatic apparatus shown in position be-
neath the key bed of a piano. Fig. 2 is a part
70 plan of the same, showing the pneumatic ap-
paratus in position on the top of the vacuum
chamber and also the disposition of the
tracker pipes leading from the valve pneu-
matics. Fig. 3 is a sectional view of the
75 lower plate of a power pneumatic and its
tubular support. Fig. 4 is a plan of a top
plate of a power pneumatic with engaging
device for key operation. Figs. 5 and 6
show transverse sections of one of the power
80 pneumatic plates, indicating the method of
attachment of the flexible envelop. Fig.
7 is a view of one of the connecting devices
between the power pneumatics and the keys
of the instrument. Fig. 8 is a sectional side
85 view of one of the brackets attached to the
piano key bed for supporting the playing
table taken on the line Z Z in Fig. 9. Fig.
9 is a front view of both brackets shown in
conjunction with the perforated front
90 board. Fig. 10 is a part sectional view of
the perforated front board on the line Y Y
in Fig. 9 and a side view of a part of the
playing table with one of the attaching
bridles engaged with the supporting
95 bracket. Fig. 11 is an enlarged sectional
view of one of the valve pneumatics.

Referring to Figs. 1, and 2, *a* is the key
bed of the piano, *b* a white key, *c* a black
key and *d* the connecting means adapted
100 to engage with a projecting finger *e* at-
tached to the top plate *g*² of the power
pneumatic *g*. The vacuum chest *h* is sup-
ported at the rear of the key bed *a* by
brackets *i* adapted to allow the whole pneu-
105 matic action to be disengaged from the key
connecting means *d* by a fore and aft move-
ment in the slot *j* and to fold down about
the trunnion *k*.

The vacuum chest *h* is made of sheet
110 metal having its top surfaces *h*¹ and *h*² ar-
ranged in different horizontal planes, pro-

viding a plurality of supporting surfaces for the flat sectioned tubular supports g^1 of the pneumatics g , which will be maintained in position by holding down strips h^3 fastened by means of screws or other equivalent devices. Along the upper surfaces h^1 and h^2 I arrange holes h^4 which communicate with the interior of supports g^1 . I arrange vacuum valves l and air valves l^1 to close the holes h^4 in the upper and lower surfaces of the tubular support g^1 . These valves are operated by means of valve pneumatics l^2 situated in the base of the vacuum chamber h . Each valve pneumatic l^2 is composed of two circular dished metal elements l^3 and l^4 of required diameter between which is disposed a flexible diaphragm l^5 which is secured to the metal elements l^3 l^4 by surrounding them completely and being bound down by a wire or thread into a groove l^6 formed in the periphery of the element l^4 . The envelop is folded inward in the space between the two elements, thus allowing the two elements to approach each other when air is exhausted. To the element l^4 I attach a spindle or stem l^7 which passing through a hole in the element l^3 carries the valves l and l^1 . The valve pneumatics l^2 are fixed in position in the base of the vacuum chamber h by the element l^3 being of conical formation and being pressed into a conical seating h^5 formed in the base of the vacuum chamber h ; that portion of the envelop l^5 which surrounds the element l^3 forms the jointing material between the pneumatics l^2 and the vacuum chamber h . A tracker pipe m is inserted into a hole in the wall of the recess h^5 corresponding to a hole in the element l^3 and a small hole m^1 is made in the base of the element l^3 to act as a bleed hole.

Each power pneumatic g is composed of two dished elements g^2 and g^3 the length of which is several times the width. These elements are connected together by a flexible impervious medium g^4 which is fastened to the sides by cement or other suitable material. In some cases I prefer to form a groove g^5 around the sides of the element and I fix the medium in place by inserting it into this groove where I hold it in place, by a wire or equivalent device. The lower plate g^3 of the pneumatic g is attached to and is carried by the tube g^1 and a suitable hole g^6 is formed between the interior of the tube g^1 and the interior of the pneumatic g ; the ends of said tube g^1 being hermetically sealed. Suitable springs g^7 are arranged on each pneumatic to maintain it in an extended condition until collapsed by the vacuum.

In order to provide for the exhaustion of the air from the vacuum chest h I provide a series of flat pipes n extending from the

inside of vacuum chest h to the front perforated board o , and I arrange these pipes beneath the power pneumatics g and above the base or bottom plate p of the instrument.

I place the tubes g connecting the tracker pipe m with the perforated board o beneath the air pipes n , and in this way I am able to make the total vertical height of the playing apparatus exceedingly small, so that no inconvenience arises to a person playing the piano by hand.

To the key bed of the piano I bolt two blocks or brackets r by means of bolts r^1 and r^2 and I place these at the extremity of the front perforated plate o and I lock the perforated plate o to the brackets r by means of horizontal pins s . This said plate is provided with a series of holes o^1 each connected by a pipe g and tracker pipe to one of the valve pneumatics l^2 and the flat air pipes n are brought to holes o^2 at the front of the perforated plate o . Two slots t are provided in the perforated plate o fitted with pins t^1 adapted to engage with the bridle t^2 hinged to the front perforated plate o of the playing table.

The playing table consists of a base u of wood or other suitable material attached to the plate t^3 and having mounted on its upper side the winding mechanism u^1 and tracker u^2 , and on the underside the reservoir u^3 and bellows u^4 of ordinary construction. The plate t^3 is perforated with holes v connected with the tracker u^2 by pipes v^1 . Further holes w are provided communicating by pipes w^1 with the reservoir u^3 . The holes v and w are so disposed as to coincide with similar holes in the front board o of the playing mechanism and the abutting faces of the plates o and t^3 are made to form an air tight joint one with the other when the bridles t^2 having engaged with the pins t^1 draw the two faces together under the action of the weight of the playing table and the strains due to operating the bellows u^4 by means of pedals adapted to work same. It follows that the bridles may be hinged to the piano and hooked on to the table without departing from this invention.

It will be understood that by arranging the various parts of a pneumatic piano player as hereinbefore described, the player mechanism can be readily and inexpensively adapted to ordinary pianos without in any way interfering with the general uses of the piano for hand-playing and at the same time the necessity of using a cumbrous piece of furniture as an adjunct to an ordinary piano for mechanical piano playing purposes is avoided by the use of my readily detachable playing table of small dimensions and weight. This construction of piano player enables those persons having a piano to obtain the advantages of a mechanical piano player of high efficiency at a very

moderate cost and in situations where the space available has hitherto precluded the use of a cabinet player.

It will be recognized that it is entirely owing to the use of stamped metal parts and the method of assembling and supporting the various parts of the mechanism that sufficient compactness can be achieved to allow of its being fixed beneath the key bed of the piano without interference with the comfort and knee room of persons playing the piano by hand.

It is pointed out that as all parts of the apparatus are visible in its completed form, inspections for repair or adjustment are very readily made and a cheap class of labor can be employed for the initial erection at the factory.

Having now particularly described my invention, what I desire to secure by Letters Patent is:—

1. In pneumatic piano playing mechanism, in combination, a piano, pneumatically operated devices situated beneath the key board of the piano, tension devices passing through the key bed adapted to operate the keys, a vacuum chest, trunk pipes connecting therewith, a perforated front plate, comprising apertures communicating with the said pneumatically operated devices and with the trunk pipes to the vacuum chest, said plate being rigidly mounted on the front of the piano key bed, connecting means from the pneumatic mechanism and vacuum chest to said perforated front plate, a detachably attached playing table carrying a tracker, rolling gear, bellows, and reservoir, a perforated plate carried by said table corresponding to said rigidly mounted perforated front plate and provided with connections to the tracker, bellows, the reservoir, and means for forming a temporary joint between the faces of the two perforated plates, substantially as described.

2. In pneumatic piano playing mechanism, in combination, a piano, pneumatically operated devices situated beneath the key bed of the piano, tension devices passing through the key bed and controlled by the pneumatically operated devices for operating the keys, a vacuum chest provided with upper surfaces in different horizontal planes, tubular supports mounted upon said surfaces and communicating with said vacuum chest and supporting the pneumatically operated devices, a perforated front plate rigidly mounted on the front of the piano key bed, connecting means from the pneumatic mechanism to said perforated front plate, a detachably attached playing table carrying a tracker, rolling gear, bellows, and a reservoir, a perforated plate carried by said table corresponding to said rigidly mounted perforated front plate and

provided with connections to the tracker, bellows and reservoir, and means for forming a temporary joint between the faces of the two perforated plates, substantially as described.

3. In pneumatic piano playing mechanism, in combination, a piano, pneumatically operated devices situated beneath the key bed of the piano, tension devices passing through the key bed and controlled by the pneumatically operated devices for operating the keys, a vacuum chest having a series of conical seatings, a series of valve pneumatics, each consisting of two circular elements connected together by a flexible envelop and having one of said elements held within and making a joint with one of the conical seatings, a perforated front plate rigidly mounted on the front of the piano key bed, connecting means from the pneumatic mechanism to said perforated front plate, a detachably attached playing table carrying a tracker, rolling gear, bellows and a reservoir, a perforated plate carried by said table corresponding to said rigidly mounted perforated front plate and provided with connections to the tracker, bellows and reservoir, and means for forming a temporary joint between the faces of the two perforated plates, substantially as described.

4. In pneumatic piano playing mechanism, in combination, a piano, pneumatically operated devices situated beneath the key bed of the piano, tension devices passing through the key bed and controlled by the pneumatically operated devices for operating the keys, each pneumatically operated device consisting of a pair of dished elements having grooved edges and a flexible envelop entering said grooves, and means for retaining in an air tight manner the envelop in the said grooves, a perforated front plate rigidly mounted on the front of the piano key bed, connecting means from the pneumatic mechanism to said perforated front plate, a detachably attached playing table carrying a tracker, rolling gear, bellows and a reservoir, a perforated plate carried by said table corresponding to said rigidly mounted perforated front plate and provided with connections to the tracker, bellows and reservoir, and means for forming a temporary joint between the faces of the two perforated plates, substantially as described.

5. In pneumatic piano playing mechanism, in combination, a piano, pneumatically operated devices situated beneath the key bed of the piano, tension devices passing through the key bed and controlled by the pneumatically operated devices for operating the keys, a perforated front plate rigidly mounted on the front of the piano key bed, connecting means from the pneumatic

mechanism to said perforated front plate, air trunks disposed beneath the pneumatically operated devices and connecting the vacuum chest with the said perforated front plate, a detachably attached playing table carrying a tracker, rolling gear, bellows, and a reservoir, a perforated plate carried by said table corresponding to said rigidly mounted perforated front plate and provided with connections to the tracker, bellows, and reservoir, and means for forming a temporary joint between the faces of the two perforated plates, substantially as described.

6. In pneumatic piano playing mechanism, in combination, a piano, pneumatically operated devices situated beneath the key bed of the piano, tension devices passing through the key bed and controlled by the pneumatically operated devices for operating the keys, a perforated front plate rigidly mounted on the front of the piano key bed, connecting means from the pneumatic mechanism to said perforated front plate, a detachably attached playing table carrying a tracker, rolling gears, bellows, and a reservoir, a perforated plate carried by said table corresponding to said rigidly mounted perforated front plate and provided with connections to the tracker, bellows, and reservoir, brackets rigidly attached to the key bed of the piano and supporting the fixed perforated front plate and means for making a temporary joint between the playing table and the perforated front plate carried

on the key bed of the piano, substantially as described.

7. In pneumatic piano playing mechanism, in combination, a piano, pneumatically operated devices situated beneath the key bed of the piano, tension devices passing through the key bed and controlled by the pneumatically operated devices for operating the keys, a perforated front plate rigidly mounted on the front of the piano key bed, connecting means from the pneumatic mechanism to said perforated front plate, a detachably attached playing table carrying a tracker, rolling gear, bellows, and a reservoir, a perforated plate carried by said table corresponding to said rigidly mounted perforated front plate and provided with connections to the tracker, bellows, and reservoir, brackets rigidly attached to the key bed of the piano and supporting the fixed perforated front plate and pivoted bridles for holding up the playing table and simultaneously and automatically forming an air tight joint between the playing table and the fixed perforated front plate, carried on the key bed of the piano, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CLAUDE WILLIAM ATKINSON.

Witnesses:

CHAS. R. BULLOUGH,
FREDK. L. RAND.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."