

No. 842,374.

J. A. ARMSTRONG.

PATENTED JAN. 29, 1907.

MECHANICAL APPARATUS FOR PLAYING KEYBOARD MUSICAL INSTRUMENTS.

APPLICATION FILED SEPT. 22, 1906.

3 SHEETS—SHEET 1.

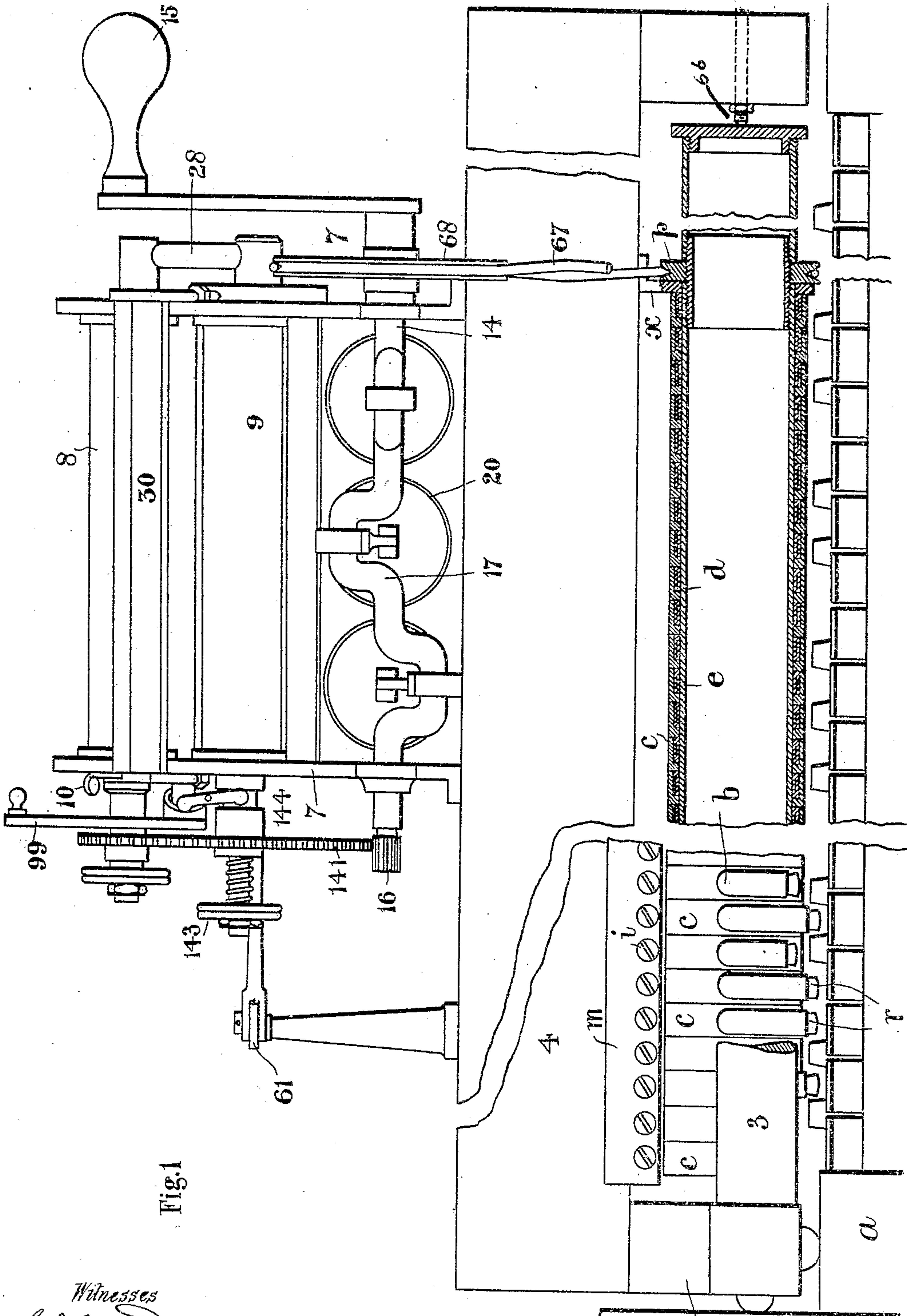


Fig. 1

Witnesses
E. D. Barlow
Albert V. Deale

Inventor
John Arthur Armstrong
per *Herbert Sefton Jones*
Attorney

No. 842,374.

J. A. ARMSTRONG.

PATENTED JAN. 29, 1907.

MECHANICAL APPARATUS FOR PLAYING KEYBOARD MUSICAL INSTRUMENTS.

APPLICATION FILED SEPT. 22, 1906.

3 SHEETS—SHEET 2.

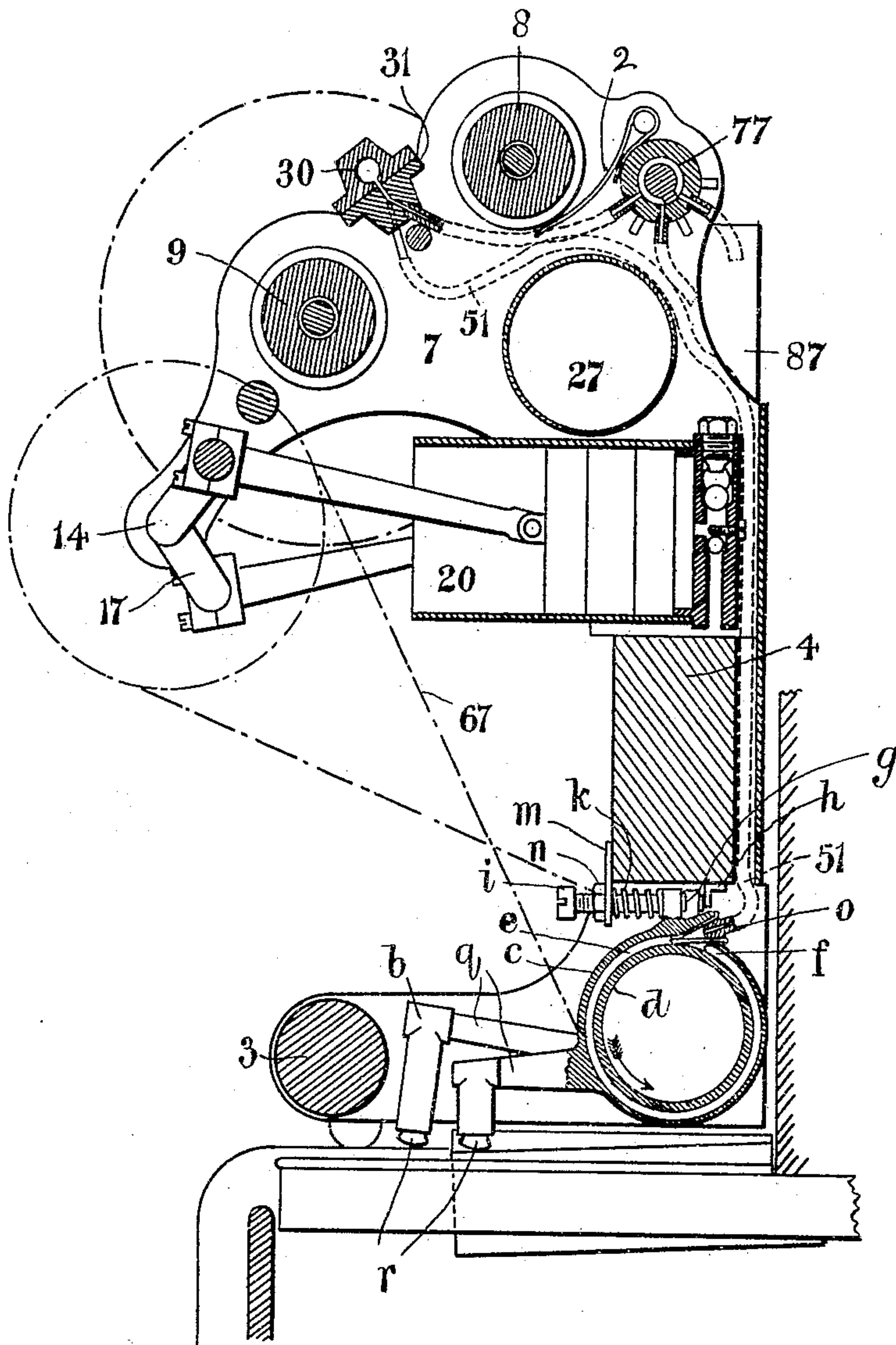


Fig. 2.

Witnesses.
E. D. Bartlett
Albert V. Deane

Inventor
John Arthur Armstrong
per *Herbert Leffman Jones*
Attorney.

No. 842,374.

PATENTED JAN. 29, 1907.

J. A. ARMSTRONG.

MECHANICAL APPARATUS FOR PLAYING KEYBOARD MUSICAL INSTRUMENTS.

APPLICATION FILED SEPT. 22, 1906.

3 SHEETS—SHEET 3.

Fig: 3.

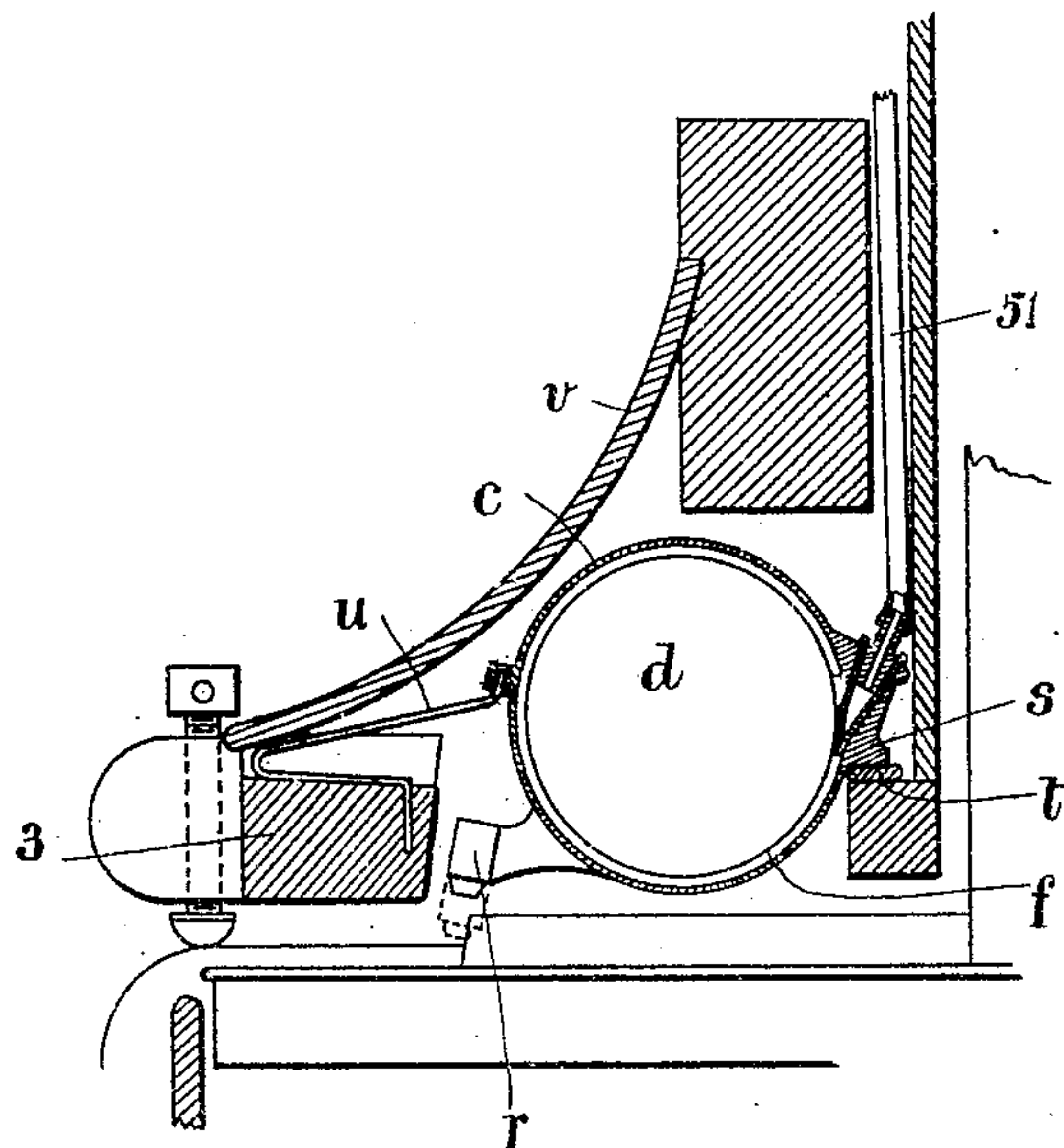
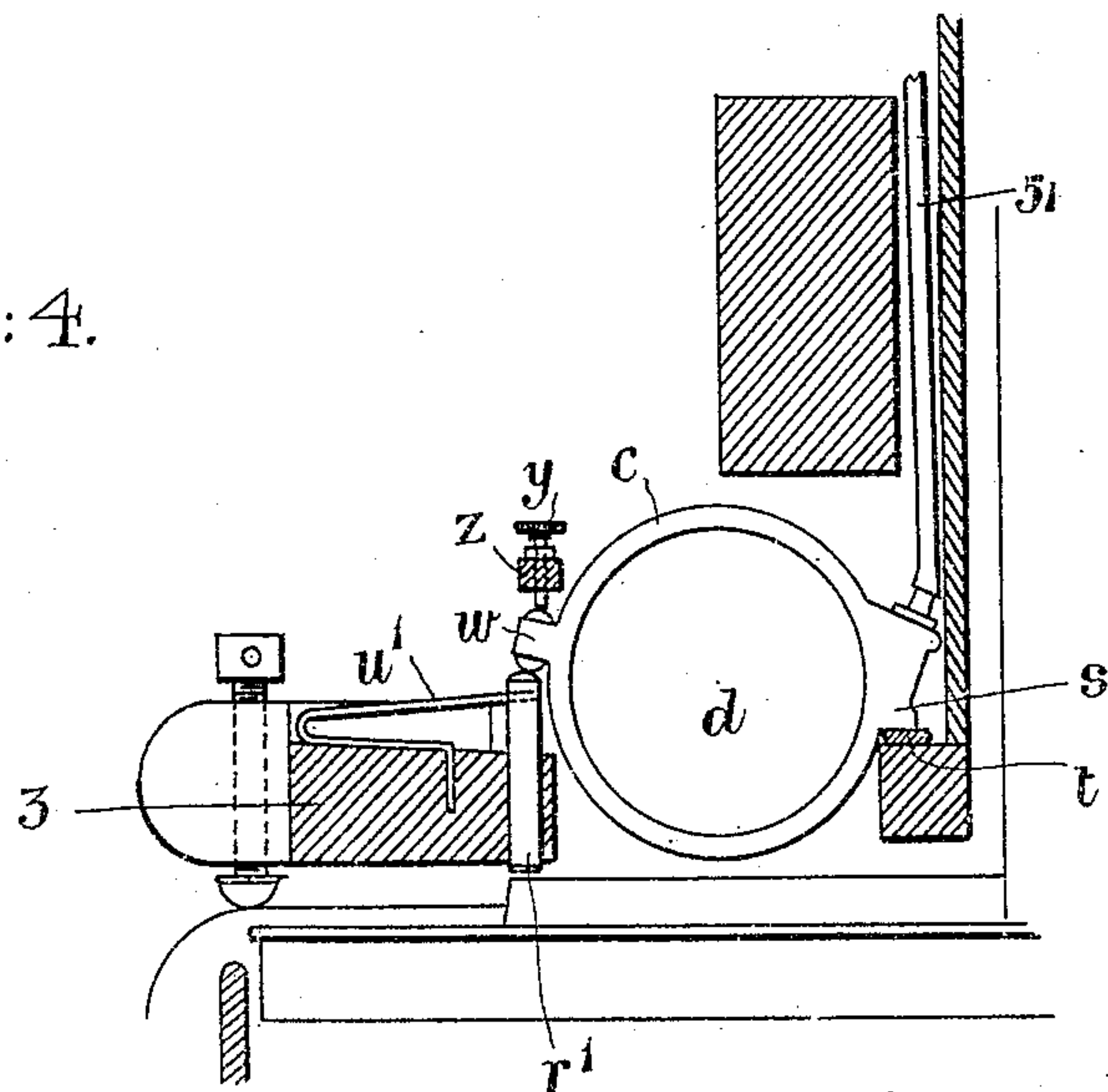


Fig: 4.



Witnesses
E. D. Bartlett
Albert V. Deane

Inventor
John Arthur Armstrong
per Herbert Leffton Jones
Attorney.

UNITED STATES PATENT OFFICE.

JOHN ARTHUR ARMSTRONG, OF WESTCOMBE PARK, ENGLAND.

MECHANICAL APPARATUS FOR PLAYING KEYBOARD MUSICAL INSTRUMENTS.

No. 842,374.

Specification of Letters Patent.

Patented Jan. 29, 1907.

Application filed September 22, 1906. Serial No. 335,768.

To all whom it may concern:

Be it known that I, JOHN ARTHUR ARMSTRONG, retired lieutenant-colonel, Royal Engineers, a subject of the King of Great Britain, residing at Gilnockie, Westcombe Park, in the county of Kent, England, have invented new and useful Improvements in Mechanical Apparatus for Playing Keyboard Musical Instruments, of which the following is a specification.

This invention relates to automatic playing apparatus for pianofortes, organs, and the like; and it has for its object an improved apparatus of the general type described in the specification of my former patent, No. 792,386.

In the instrument as constructed according to my former patent above mentioned the playing was effected by striking levers which were provided with pistons or like pneumatic devices which could be made to project from said levers and to engage with the surface of a continuously-revolving drum. The pistons were caused to project when required by air supplied from the pump through perforations in a tune-sheet traveling over a tracker-board, the pressure of the air being controlled by a device designated a "lung."

According to the present invention the strikers are arranged to have annular parts embracing the drum, while the connection between the drum and the strikers is made when required by a pneumatic frictional device. With this arrangement it is possible to make the apparatus more compact and more convenient to use. The air is supplied and regulated in substantially the same manner as before, although the frame and the arrangement of the parts thereon according to the present invention are somewhat different from the former arrangement.

The invention is illustrated in the accompanying drawings, wherein—

Figure 1 shows a partial front elevation of the apparatus sectioned in parts to show the construction more clearly. Fig. 2 shows a vertical cross-section through the center of the apparatus. Figs. 3 and 4 are detail views showing slight modifications.

The upper portion of the apparatus is substantially the same as that described in the specification of my earlier patent, and the parts are indicated by the same reference-numerals as are used in the specification and drawings of the former patent, to which lat-

ter reference should be made for a detailed description of the apparatus.

For the purpose of the present description it will suffice to say that 8 is the tune-sheet roll, (having a check-spring 2,) and 9 the winding-on roll. 30 and 31 are the perforated tracker-plates between which the tune-sheet passes. 20 is the pump, the pistons of which are worked by cranks 17 on a shaft 14, which is actuated by a handle 15. 27 is the air-pressure regulator or lung controlled by a handle 61. 77 is the octave-shunt worked by a pneumatic piston in the cylinder 87, these latter parts being of the same construction as before, but mounted in this case on the center part of the machine in proximity to the tracker. The air from the pump 20 is supplied to the lung-cylinder 27 and thence through the pipe 28 to the back of the perforated tracker-plate 30, and as perforations occur in the tune-sheet the air is allowed to pass through to corresponding perforations in the tracker-plate 31, whence it passes through tubes 51 either directly to the striking mechanism or through the octave-shunt 77 in the case of the upper and lower notes of the instrument.

It will be seen that these parts are mounted on a frame 7, supported on a beam 4, which extends the full length of the instrument and rests at its ends by supports 1 on the "cushions" *a* at the ends of the keyboard.

3 is a longitudinal stay-bar extending in this case in front of the strikers for the full length of the instrument.

The striking mechanism and means for operating it are constructed as follows: *d* is a cylinder or drum extending the full length of the keyboard and supported at its ends in bearings 66 and preferably, also, at another point by a hanger *x*. The drum is driven in the example of construction shown by a crossed driving-belt 67, working on a pulley 68 on the crank-shaft 14 and engaging over a pulley *p* on the drum *d*; but spur-gearing or chain-and-sprocket gearing might be substituted, if preferred. Each striker *b* has an annular part *c* embracing the drum, but leaving a space between the two in which is inserted a flattened inflatable tube *e*. The end *f* of this tube is closed, but the other end is open and communicates through a nipple *o* with the flexible air-tube 51. The annular part *c* has a projection at the top carrying a plug *g*, adapted to act as a buffer against a rail *h*, this projection being normally pressed

back against the rail by a spring k , surrounding a set-screw i . This set-screw is passed through a plate m at the front of the beam 4 and has a lock-nut n for fixing it in any required position. The same device is provided for each key of the keyboard, the strikers for the black keys being generally shorter than those for the white keys, as illustrated in Fig. 2, in order that sufficient space may be conveniently obtained for the various strikers.

The arms g of the strikers may be made of flexible metal, so that they may be bent to bring the ends of the strikers correctly over the keys in case the instrument as made should not have the strikers in exactly the right positions. Each striker has a pad r for depressing the key.

The instrument described above operates as follows: Whenever air under pressure is allowed to pass by one of the perforations in the tune-sheet, it reaches the nipple o of the corresponding striker and inflates the flattened tube e between the continuously-rotating drum d and the annular part c of the striker. Sufficient friction is thus produced to cause the drum to carry round the striker while compressing the spring k , and the force of the stroke imparted to the key is controlled by the air-pressure supplied by the lung 27, by which the degree of inflation of the tube e is controlled. Immediately that the supply of air under pressure is stopped the air leaks out from the tube e through a fine hole provided in any convenient position. The frictional engaging parts are thus released, and the striker is again raised by the action of the spring k , which presses back the projection at the top of the striker until the plug g lies against the rail h . The flattened tube e may be of india-rubber or any other suitable material, and it may be provided with frictional gripping-surfaces of leather or the like or even of thin strip metal, or an elastic ring or coil might be used adapted to be forced outward or inward by any inflatable container for the air under pressure.

It will be seen in Fig. 1 that the annular parts c of the strikers take a bearing at one point on the cylinder d , so that they are always centered on the cylinder, and the tube e only serves as a connecting means when it is inflated. The outer surface of the tube may be attached by a suitable cementing material to the interior of the annular part c .

It is to be understood, of course, that in place of the spring k and the stop device for the striker, comprising the buffer, the rail h , and set-screw i , any equivalent devices might be provided including stops and a spring or weight tending to return the striker to its normal position. Further, the apparatus need not necessarily be constructed as a whole in the manner hereinbefore described and illustrated, as the striker mech-

anism may be employed in conjunction with any convenient form of piano-player mechanism arranged to supply air under pressure and to control the supply of air to the separate strikers by a perforated tune-sheet.

Figs. 3 and 4 show slight modifications of the striker mechanism, the object of which will be evident. In Fig. 3 the annular part c of the striker is provided with a projection at s , adapted to rest on a padded rail t at the back of the instrument when the striker is not in action. At the front the ring c is supported by a spring u , mounted on the cross-bar 3 of the instrument, as shown. The spring u and the projection s together serve to support the annular part c of the striker, so that the friction of said striker on the drum d is largely reduced, or practically eliminated, except when the tube f is inflated for striking a note. v represents a cover or shield for the operating mechanism.

The device illustrated in Fig. 4 is designed for a similar purpose, the projection s and padded rail t being provided as above described; but the actual striker r instead of being on the ring c is now formed as a bar r' , which is arranged to slide through the longitudinal piece 3 and to be normally held up by the spring u' . The ring c now has a projection at w , adapted to depress the striker-bar r' . When the striker is not in action, the spring u' holds up the bar r' , thus lifting the projection w to the extent permitted by a set-screw y , arranged in a support z , and when so raised the ring c is held up so as to surround the drum d without exerting friction thereon.

It is to be understood that the mechanical playing mechanism, as shown in Figs. 2, 3, and 4, may be used to operate in any convenient position on the keys of a keyboard or on sets of duplicate keys or striking devices in connection with a piano-action, no matter in what position such keys may be in the instrument.

The apparatus may be driven by hand or foot power or by any motor apparatus.

What I claim is—

1. In an automatic player for keyboard musical instruments a key-striking mechanism comprising a continuously-revolving drum, a set of key-striking devices each including a ring arranged to embrace the drum, and inflatable means of connection for frictionally engaging the ring of each striking device to the drum.

2. In an automatic player for keyboard musical instruments a key-striking mechanism comprising a continuously-revolving drum, a set of key-striking devices each including a ring adapted to embrace the drum, means for normally holding the ring in the position in which the striker is not depressing its key, and inflatable means of connection for frictionally engaging the ring to the drum.

3. In an automatic player for keyboard

musical instruments a key-striking mechanism comprising a continuously-revolving drum, a set of key-striking devices each including a ring arranged to embrace the drum, 5 a projection on each ring and a coacting surface for said projection, means adapted to turn the ring so that the projection normally rests on its coacting part and inflatable means of connection for frictionally engaging the 10 ring to the drum.

4. In an automatic player for keyboard musical instruments a key-striking mechanism comprising a continuously-revolving drum, a set of key-striking devices each in-

cluding a ring arranged to embrace the drum, 15 a projection on each ring and a fixed stop for said projection, a spring tending to hold the ring against said projection and to hold the striking member away from the key and inflatable means of connection for frictionally 20 engaging the ring to the drum.

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

JOHN ARTHUR ARMSTRONG.

Witnesses:

HUBERT A. GILL,

LEONARD E. HAYNES