

No. 684,370.

Patented Oct. 8, 1901.

H. J. HAGEN & G. McINTOSH.  
PHONOGRAPH.

(Application filed Nov. 16, 1900.)

(No Model.)

Fig. 1.

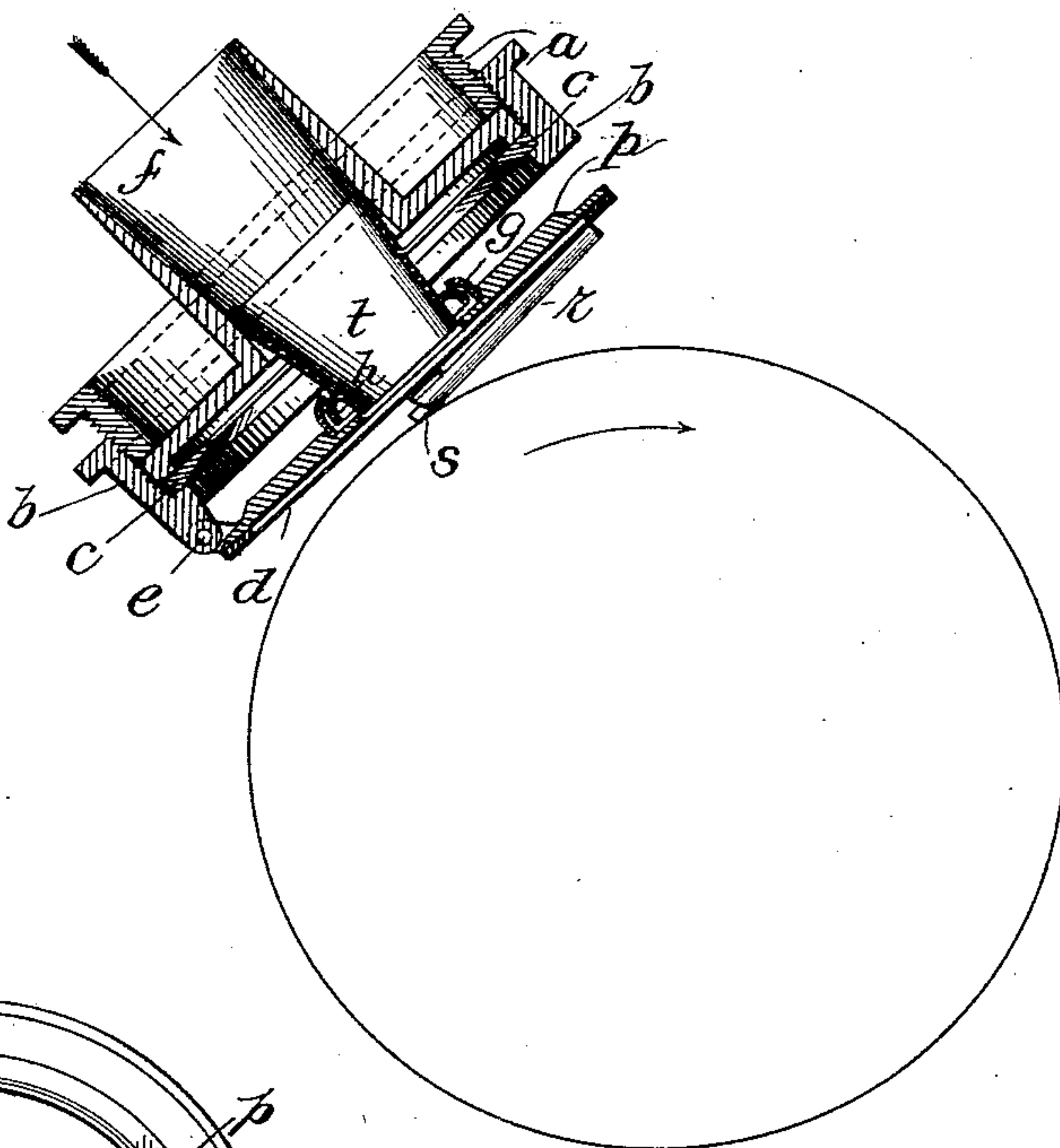
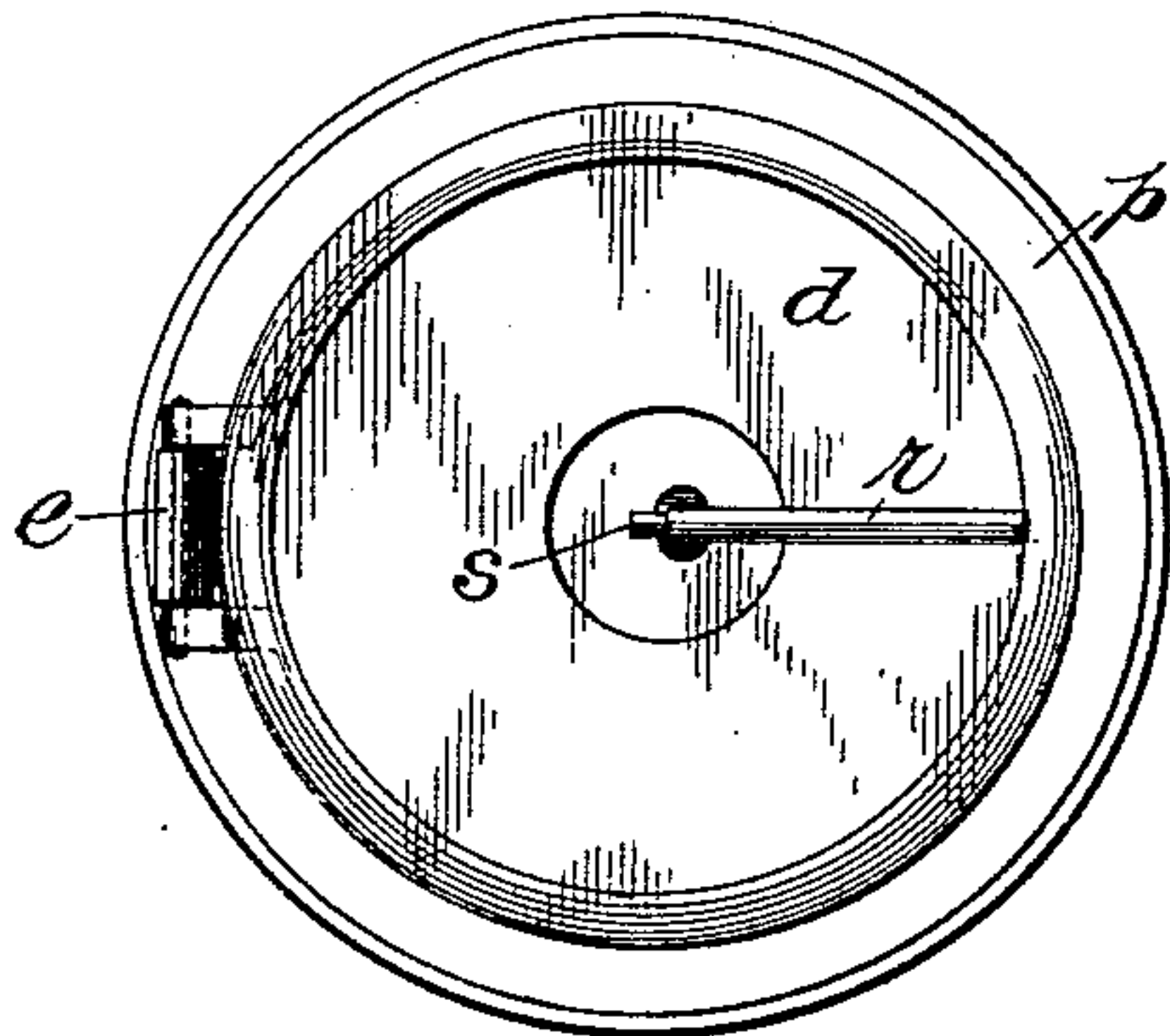


Fig. 2.



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# UNITED STATES PATENT OFFICE.

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## PHONOGRAPH.

SPECIFICATION forming part of Letters Patent No. 684,370, dated October 8, 1901.

Application filed November 16, 1900. Serial No. 36,708. (No model.)

*To all whom it may concern:*

Be it known that we, HENRY J. HAGEN and  
GEORGE MCINTOSH, citizens of the United  
States, residing at Newark, in the county of  
Essex and State of New Jersey, have made a  
new and useful Invention in Phonographs, of  
which the following is a specification.

Our invention is directed to an improve-  
ment in phonographs in which the recording-  
stylus is adapted to follow the inequalities of  
the surface of a phonograph-record; and it  
has for its objects, first, to diminish the weight  
of the parts to which the recording-stylus is  
attached, and, second, to so arrange the parts  
of the entire apparatus that all of the sound-  
waves that enter the sound-conveying tube  
shall pass directly to the diaphragm from the  
source of sound and in such manner that by  
reason of the extreme lightness and flexibility  
or yielding nature of the parts the best vi-  
bratory effects are had from the diaphragm  
and stylus.

For a full and clear understanding of our  
invention, such as will enable others skilled  
in the art to construct and use the same, ref-  
erence is had to the accompanying drawings,  
in which—

Figure 1 is a sectional view taken through  
the body of the preferred form of our im-  
proved instrument, a phonographic-record  
cylinder being illustrated diagrammatically;  
and Fig. 2 is a plan view of the instrument  
as seen looking at Fig. 1 from the lower right-  
hand corner of the drawings toward the upper  
left-hand corner thereof.

Referring now to the drawings in detail and  
first to Fig. 1, *d* represents the diaphragm,  
made, preferably, of thin glass and secured  
at its outer edge by a ring of cement, glue, or  
otherwise to the outer edge of a light metal-  
lic diaphragm-supporting disk *p*, provided at  
its center with an opening, there being suffi-  
cient space between the lower surface of said  
disk and the diaphragm to give the necessary  
vibratory effect thereto.

*b* represents the body of the instrument, of  
usual form, to which the diaphragm *s* is piv-  
otally attached at *e*.

*f* represents the sound-conveying tube, hav-  
ing a flange-shaped supporting part at its

lower end, as shown, and secured in the usual  
manner by a screw-threaded ring *a*, which  
when in position holds the tube *f* securely  
within the body *b*, with the flange against a  
ring or washer *c*.

*t* represents independent sound-conveying  
means in the nature of a thimble having the  
form or shape of the frustum of a cone and  
provided at its lower end with a ball-shaped  
extension *h*, adapted to fit within a corre-  
sponding socket *g*, attached to the diaphragm-  
supporting disk *p*, said parts being all of light  
metal and so constructed that when secured  
together in the manner shown there is free-  
dom of movement of the entire structure  
about the pivotal point *e* and of the upper  
end of the thimble *t* in the lower end of the  
tube *f*.

*r* represents a rod secured at one edge and  
the center of the diaphragm in the usual man-  
ner and provided with the usual sapphire re-  
cording-stylus *s*.

The operation is as follows: When the pho-  
nograph-record cylinder is rotated from left  
to right in the direction of the curved arrow  
and sounds are emitted in the direction of  
the straight arrow into the tube *f* and thim-  
ble *t*, the diaphragm is caused to vibrate in  
the usual manner, and by reason of the piv-  
oted support thereof and attached parts, to-  
gether with the ball-and-socket support of the  
conical sound-conveying thimble *t* in the  
lower end of the tube *f*, the stylus *s* readily  
partakes of such movements as the inequali-  
ties of the surface of the record may possess,  
and at the same time the thimble *t* adjusts  
itself with relation both to the tube *f* and the  
diaphragm-supporting disk *p* and in such  
manner that none of the sound-waves which  
enter the tube *f* are permitted to escape; but  
all of them are concentrated upon the center  
of the diaphragm.

It will be appreciated that owing to the ex-  
treme lightness of all of the parts the full vi-  
bratory effect of the diaphragm *d* is imparted  
to the stylus *s* under all conditions of usage,  
said diaphragm not being under any abnor-  
mal strain, but susceptible of delicate move-  
ments for the most delicate sounds.

We do not limit our invention to the especial



details of construction shown and hereinbefore described, as we believe we are broadly entitled to claim a phonographic sound-recording instrument in which the diaphragm is  
 5 yieldingly secured to the body of the instrument and the sound-conveying means is in turn yieldingly attached to the diaphragm-supporting disk, said sound-conveying means being free or independent of the body of the  
 10 instrument itself, whereby extreme lightness and flexibility of the operative parts of the instrument are secured, and our claims are generic as to this feature. Although we have shown the diaphragm-supporting disk *p* pivotally secured to the body or frame of the  
 15 instrument, we contemplate other yielding means of support, the essence of our invention lying broadly in utilizing the principle of supporting the diaphragm and its immediate attachments independently of the frame  
 20 of the instrument in such manner that the recording-stylus follows the inequalities of the record-cylinder and is subjected to a minimum amount of pressure therefrom, while  
 25 substantially all of the sound-waves are conveyed directly to the diaphragm by reason of the yielding nature of the parts between the diaphragm and the sound-conveying tube; nor do we limit our invention in its applica-  
 30 tion to a recording-phonograph, as it may obviously be used in connection with sound-reproducing phonographs, and our claims are designed to include all such structures.

Having thus described our invention, what  
 35 we claim, and desire to secure by Letters Patent of the United States, is—

1. A phonograph having its diaphragm-supporting disk, and diaphragm and recording-stylus carried thereby, secured yieldingly  
 40 to the body of the instrument; in combination with sound-conveying means carried directly by the diaphragm-supporting disk and yieldingly attached thereto with its free end extending into the sound-conveying tube carried by the body of the instrument, substantially  
 45 as described.

2. A phonograph having its diaphragm-supporting disk, and diaphragm and record-

ing-stylus carried thereby, secured to the body of the instrument; in combination with  
 50 sound-conveying means consisting of a thimble having the shape of the frustum of a cone, with its smaller end yieldingly attached to the diaphragm-supporting disk and its larger end extending into the sound-con-  
 55 veying tube and adapted to move freely therein, substantially as described.

3. A phonograph having its diaphragm, diaphragm-supporting disk and recording-stylus pivotally secured to the body of the  
 60 instrument; in combination with sound-conveying means yieldingly attached to the diaphragm-supporting disk and extending upward with its upper end free to move in the lower end of the sound-conveying tube, the  
 65 arrangement being such that all of the sound-waves which enter the sound-conveying tube will be concentrated upon the diaphragm, substantially as described.

4. A phonograph having its diaphragm, diaphragm-supporting disk and recording-stylus pivotally secured to the body of the  
 70 instrument; in combination with a conical-shaped thimble having its lower end yieldingly attached to the diaphragm-supporting  
 75 disk and its upper end free to move in the lower end of the sound-conveying tube, substantially as described.

5. A phonograph having its diaphragm, diaphragm-supporting disk and recording-stylus pivotally secured to the body of the  
 80 instrument; in combination with a conical-shaped thimble connected by ball-and-socket joint to the diaphragm-supporting disk with its upper end free to move in the lower end  
 85 of the sound-conveying tube, substantially as described.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

HENRY J. HAGEN.  
 GEORGE MCINTOSH.

Witnesses:

C. J. KINTNER,  
 J. NEWCOMB BLACKMAN.