

Jan. 6, 1931.

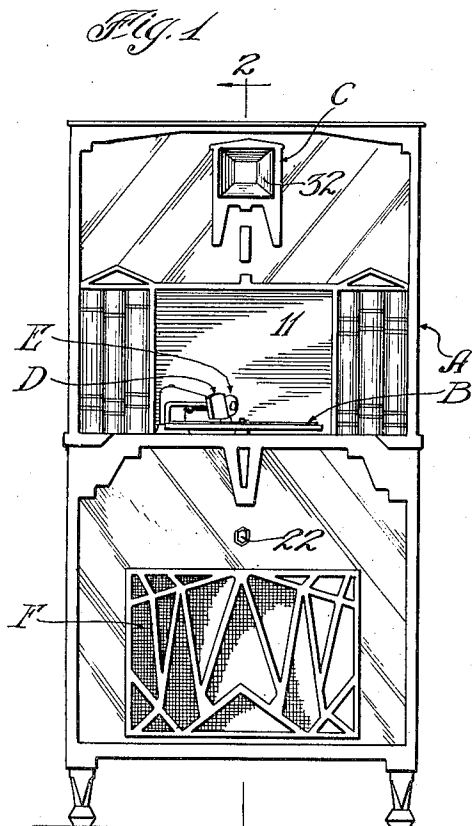
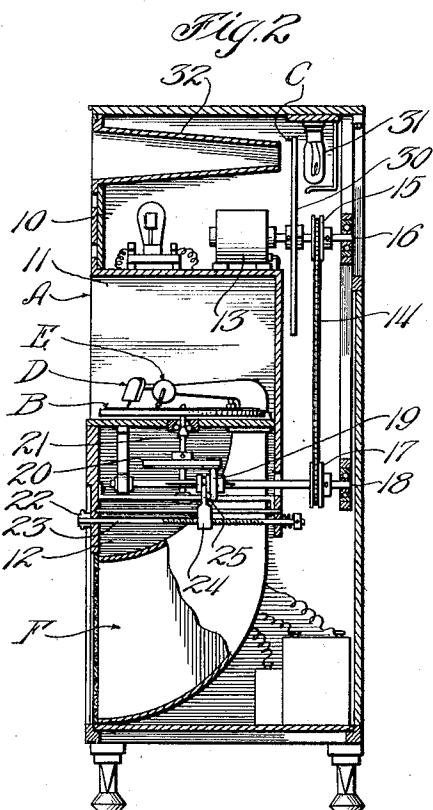
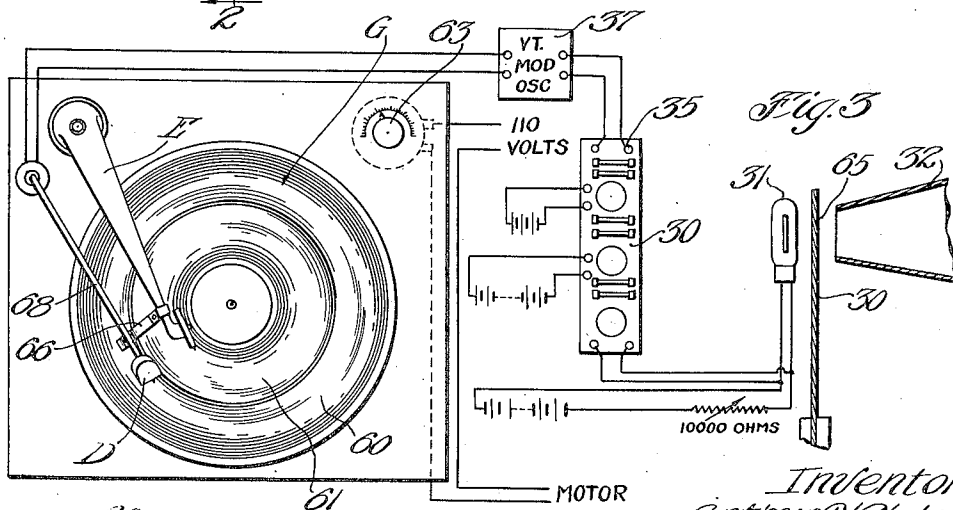
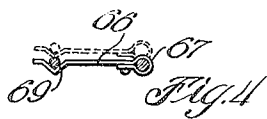
A. H. WATSON

1,787,919

APPARATUS FOR PRODUCING SPEAKING AND SOUND PICTURES

Filed March 6, 1929

2 Sheets-Sheet 1



Inventor:
Arthur H. Watson
By Williams, Bushong, McCall & Kinkadee
Attys.

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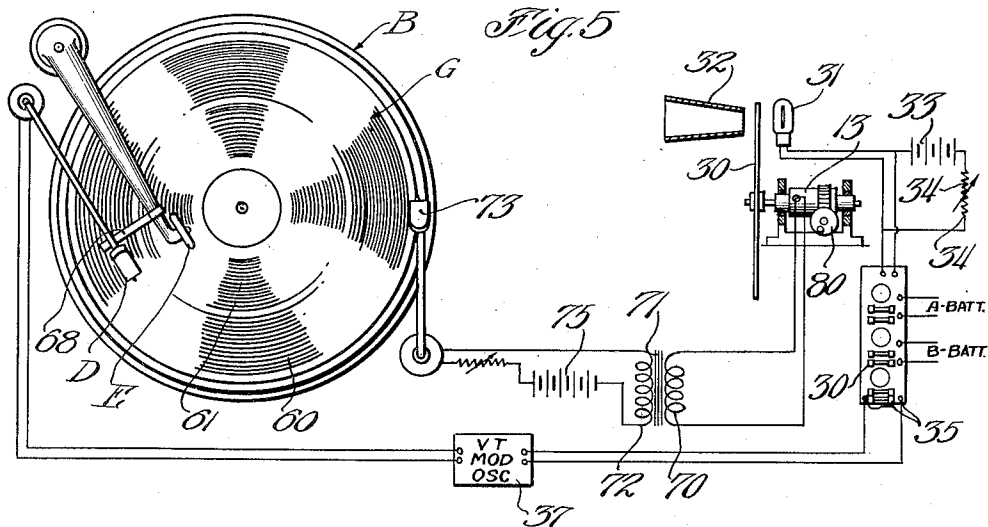
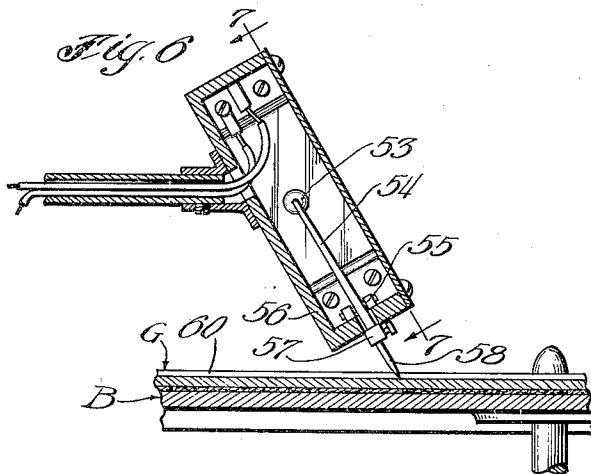
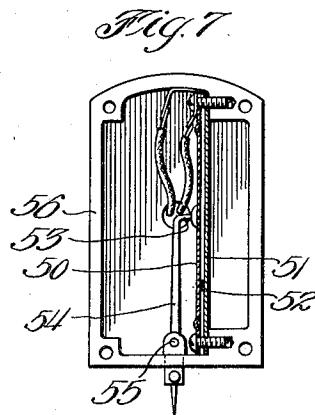
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APPARATUS FOR PRODUCING SPEAKING AND SOUND PICTURES

Filed March 6, 1929

2 Sheets-Sheet 2



Inventor:
Arthur H. Watson
By Williams, Broadbent, McCall & Smith
Attys.

UNITED STATES PATENT OFFICE

ARTHUR H. WATSON, OF EVANSTON, ILLINOIS

APPARATUS FOR PRODUCING SPEAKING AND SOUND PICTURES

Application filed March 6, 1929. Serial No. 344,632.

This invention relates to an apparatus for producing speaking and sound pictures.

Devices are known whereby electrical signals may be converted into visible light to form a picture and in using such devices commonly known in the art as television apparatus, it is customary to simultaneously transmit picture and sound signals from a broadcasting station in the form of modulated waves and to reproduce the signals through separate receiving instruments at the receiving station.

The present invention contemplates the provision of apparatus for reproducing and synchronizing a picture and sound from a permanent record, in appearance resembling the ordinary type of phonograph record and which may be reproduced when and as often as desired.

An object of the invention is to provide a simple and effective device for producing speaking or sound pictures from a single revolving record.

Another object is to provide a simple and positive means for synchronizing both picture and speech or other contemporaneous sound.

This invention is illustrated in the accompanying drawings forming a part of this specification wherein:

Figure 1 is a front elevation of apparatus, embodying the invention.

Figure 2 is a sectional view substantially along the line 2—2.

Figure 3 is a top plan view of a part of the apparatus illustrated in Figures 1 and 2.

Figure 4 is a sectional view along the line 4—4 of Figure 3.

Figure 5 is a top plan view with parts in elevation, illustrating a modified form of the apparatus.

Figure 6 is an enlarged sectional view of the electrical pick-up employed in the reproduction of the picture light impulses.

Figure 7 is a view along the line 7—7 of Figure 6.

In general, my invention comprises a cabinet A housing therein a standard phonograph turn-table B, picture forming apparatus C responsive to electrical impulses and an elec-

trical pick-up D for engagement for a phonograph record placed upon the turn-table B, for receiving mechanical impulses from the record to be translated into electrical impulses and thence, to light impulses in the apparatus C and a standard phonograph tone arm and reproducer element E with its associate air column horn or sound amplifier F. The record G is employed as two separately grooved portions, one of which comprises a record of sound with which the tone arm and reproducer E are associated in use and the other of which comprises a record of a picture pertinent to the sound with which the pick-up D is associated in use.

The cabinet A is divided into three major compartments: 10, 11 and 12. The compartment 11 houses the turn-table B with the tone arm E and pick-up D.

The turn-table B is actuated by an electric motor 13 which also serves to drive the moving parts of the picture reproducing or television apparatus C.

The interconnecting mechanism between turn-table B and motor 13 consists of a link chain 14 driven by a sprocket wheel 15, carried upon the shaft 16 of the motor 13 and which in turn drives a sprocket wheel 17 on a rotatably mounted shaft 18 in compartment 12. A friction drive wheel 19 is feathered upon shaft 18 and is frictionally engaged with a driven plate 20, carried by shaft 21 of turn-table B.

In order that complete synchronism between the picture reproducing apparatus C and the rotating record G may be obtained, an adjustment mechanism operated by control knob 22 is provided to vary the position of the friction wheel 19 by a shaft 18. This control mechanism comprises a threaded shaft 23, extending inwardly from the control knob 22 and which has an internally threaded block 24 threaded thereupon. The block 24 has a finger 25 which engages with the friction wheel 19 so that rotation of shaft 23 will cause the friction wheel to move toward or away from the center of the shaft 21 and hence, vary the speed between the motor 13 and the turn-table B.

The picture reproducing apparatus C is

identical in structure to that apparatus commonly known in the art as television apparatus and comprises a spirally perforated disc 30, mounted upon the motor shaft 16, a neon lamp 31, mounted at the rear adjacent the periphery of the disc. A light funnel 32 is disposed in the upper compartment 10 of the cabinet and has its smaller end immediately in front of the disc 30 and on the same axis with the center of the lamp 31 and its larger end extending through the front wall 33 of the compartment 10.

A power amplifier 30 is disposed in compartment 10 with its output terminals connected directly with the lamp 31. Additional B current 33 in series with a high resistance 34 is shunted across the terminals of the lamp 31.

The amplifier 30 is of that type commonly known in the art as a resistance coupled amplifier and is capable of amplifying signal impulses to a degree sufficient to operate the neon lamp 31 to cause it to vary in intensity in direct proportion to the strength and duration of the signal impulses.

The input terminals 35 of the amplifier 30 are connected to the output terminals of a voltage modulator oscillator 37, the structure of which is well known in the radio art. The input terminals of the voltage modulator oscillator are connected in turn directly with the spaced apart plates 50 and 51 of the electric pick-up D. This pick-up is more clearly illustrated in Figures 6 and 7 and is what is known in the art as a capacity type pick-up; that is, it is virtually a tiny condenser having a relatively wide air gap 52 between its spaced apart plates 50 and 51. The plate 50 is of less density and thickness than the plate 51 and is mechanically connected at 53 and arm 54 fulcrumed at its remote end 55 to the case 56 of the pick-up. The outer or lower end 57 of the arm is fashioned to form a socket for receiving a phonograph needle 58 which needle is intended for direct contact with those grooves of the record G upon which picture forming impulses have been recorded.

As heretofore explained, the record B comprises both a record of picture impulses and sound impulses. Grooves 60 representing the picture impulses are formed on the outer half of the record B, while grooves 61, representing the sound impulses are on the inner half of the record (see Figure 3). This arrangement is carried out to assure a relatively great rim speed in that part of the record upon which the higher frequency or picture impulses are impressed so that no detail may be lost, due to the necessity of congesting the individual frequency impressions as the record is recorded.

It is contemplated that the speed of the turn-table B shall be in the neighborhood of 100 R. P. M. which is slightly higher than

the speed obtained in the operation of the ordinary sound reproducing record turn-table.

In operation, the record B bearing a record of picture impulses and sound impulses in its grooves 60 and 61 is placed upon the turn-table B and the motor 13 is started. The speed of the motor is regulated by a rheostat control at 63.

As the speed of the motor is arbitrarily fixed by adjustment of the rheostat 63, so also is the speed of both the scanning disc 30 and the turn-table B and the relative speeds of the disc 30 and turn-table B are at fixed relationship with one another. The relative speed of the disc 30 and the turn-table B may be varied by manipulation of the hand control 22 which adjusts the friction wheel 19 with respect to its associate friction disc 20 on the shaft 21 of the turn-table, so that the movement of the disc 30 may always properly coincide with the movement of the record G, particularly the grooves 60 as they pass under and actuate the electrical picture pick-up D. In this manner perfect synchronism in the reproduction of the television picture is attained and maintained.

The operation of the picture reproducing or television apparatus consists briefly in the modulating of the output current from the voltage modulator oscillator 37 by actuation of the electrical pick-up D. This modulated current is amplified by the amplifier 30 and the current thus amplified, serves to operate the neon or glow lamp 31 and cause it to rise and fall in brilliancy in degrees determinable by the nature of the recorded picture impulses in the grooves 60. The picture is built up of a plurality of light spots viewed by the observer and formed by light passing through a series of spirally arranged openings 65 in the scanning disc 30. I shall not describe in greater detail the operation of the picture reproducing apparatus C as its structure and operation is well established in the art of television.

Simultaneously, with the reproduction of the picture observed through the light funnel, speech, music or other sounds are reproduced by the tone arm and reproducer E engaging the groove 61 and amplified by the air column horn F which speech, music or other sound is pertinent to the picture and synchronized therewith, by the proper relationship between the sound reproducer E and the electrical pick-up D.

This proper relationship between the sound reproducer and the electrical pick-up D with respect to the grooves 61 and 60 is accomplished by the provision of an arm 66, secured at 67 to the tone arm E and extending laterally therefrom, beneath a hollow rod 68, upon which the electrical pick-up D is mounted. When the tone arm E is lifted, the rod 68 falls into a V-shaped groove in the

arm 66 and thus establishes a fixed distance between the sound reproducer and the electrical pick-up D. As the sound reproducer is lowered toward the groove 61 of the record G, the electrical pick-up D will first engage with the groove 61 of the record G, the electrical pick-up D will first engage with the groove 60 of the record G and continued lowering movement of the tone arm E, will disengage the arm 66 from the rod 68, until the sound reproducer rests in its respective groove of the groove 61. I have thus provided a simple and efficient mechanism for initially establishing correct synchronism between recorded sound and picture, the impulses which continue throughout the reproduction of the entire record G.

Should the reproduced picture at any time during the operation of the device fall out of step, i. e., out of synchronism with the recorded picture impulses in the groove 60 of the record G, as would be evidenced by a tendency to break up continuity in the picture, as between its several parallel lines, the adjustment operated by the hand group 22 is manipulated in such a manner as to bring the reproduced picture back into step with the pick-up elements represented by the electrical pick-up D and moving turn-table with its record G.

In Figure 6, I have shown the modified form of the invention, wherein I dispense with the mechanical connection between the motor 13 and the turn-table B. In this form of the invention a clock spring mechanism may be used to operate the turn-table B as is customarily done in the ordinary type of phonograph and the picture reproducing mechanism C and sound reproducing mechanism E—F are completely isolated from one another.

The rotating record G, however, is perfectly synchronized with the picture representing mechanism C by novel electrical arrangement as follows:

The motor 13 in this form of the invention is a synchronized motor, operated by a 60-cycle alternating current (the frequency of the alternating current is optional and may be varied to suit manufacturing and operating requirements). The synchronized motor 13 is one of very low horse power. A 1/25th horse power motor may be satisfactorily employed which operates by relatively weak current. This motor is driven by alternating current supplied from the secondary 70 of a transformer 71, the primary 72 of which is energized by the influence of an electrical mechanical pick-up 73, constantly engaging with an endless groove 74, having a 60-cycle wave form recorded therein which influences the current supplied to the primary 73 by a battery 75. There are several forms of electrical mechanical devices which may be substituted for the arrangement rep-

resented by the battery 75 and electrical pick-up 73 which become responsive to the 60-cycle recorded wave formed in the groove 74 to produce a pulsating current in the primary 72 and, hence, an alternating current in the secondary 70 to operate the motor 13 and maintain it at a given speed with respect to the speed of the record G.

In order that the picture formed in this modification of the invention may be properly framed, I provide mechanism 80 for rotating the entire motor 13 about its axis during operation so that the entire scanning disc 30 may be advanced or retarded with respect to the light funnel 32 to properly frame the picture.

The balance of the mechanism employed operates precisely in the same manner as that described in connection with the preferred form of the invention.

What I claim as new and desire to cover by U. S. Letters Patent is as follows:

1. An apparatus for producing sound pictures comprising a record having visual impressions, sound impressions and synchronizing impressions, means for translating the visual impressions into a visible picture, means for translating the sound impressions into sound and means responsive to the synchronizing impressions for producing a predetermined relationship between the picture and the sound.

2. An apparatus for producing sound pictures comprising a rotatable record for visual impressions, sound impressions and synchronizing impressions, means for translating the visual impressions into a visible picture, means, for translating the sound impressions into sound and other means responsive to the synchronizing impressions for influencing the visual impressions translating mechanism to maintain that mechanism synchronized with the movement of said record.

3. An apparatus for producing sound pictures comprising a movable record having visual impressions inscribed thereon, sound impressions inscribed thereon, and an additional uniformly undulated inscription thereon comprising a synchronizing impression, means responsive to the visual impressions for reproducing a visible picture, means responsive to the sound impressions for reproducing sound and synchronizing means associated with the visible picture, reproducing means responsive to said uniformly undulated inscription for maintaining synchronism between the movement of the record and the picture reproducing mechanism.

4. An apparatus for producing sound pictures which comprises a revolvable record having sound impressions thereon, and synchronizing impressions thereon, means for translating said sound impressions into sound, means for producing visible pictures

and means responsive to said synchronizing
impressions for maintaining a predeter-
mined relationship between said sound and
said picture producing means, whereby said
sound and pictures are synchronized.

5 In witness whereof, I hereunto subscribe
my name this 14 day of February, 1929.

ARTHUR H. WATSON.

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