June 26, 1928. 1,674,946

A. D. BRIXEY

MOVING PICTURE AND SOUND REPRODUCING MACHINE

Original Filed April 5, 1915 6 Sheets-Sheet 1

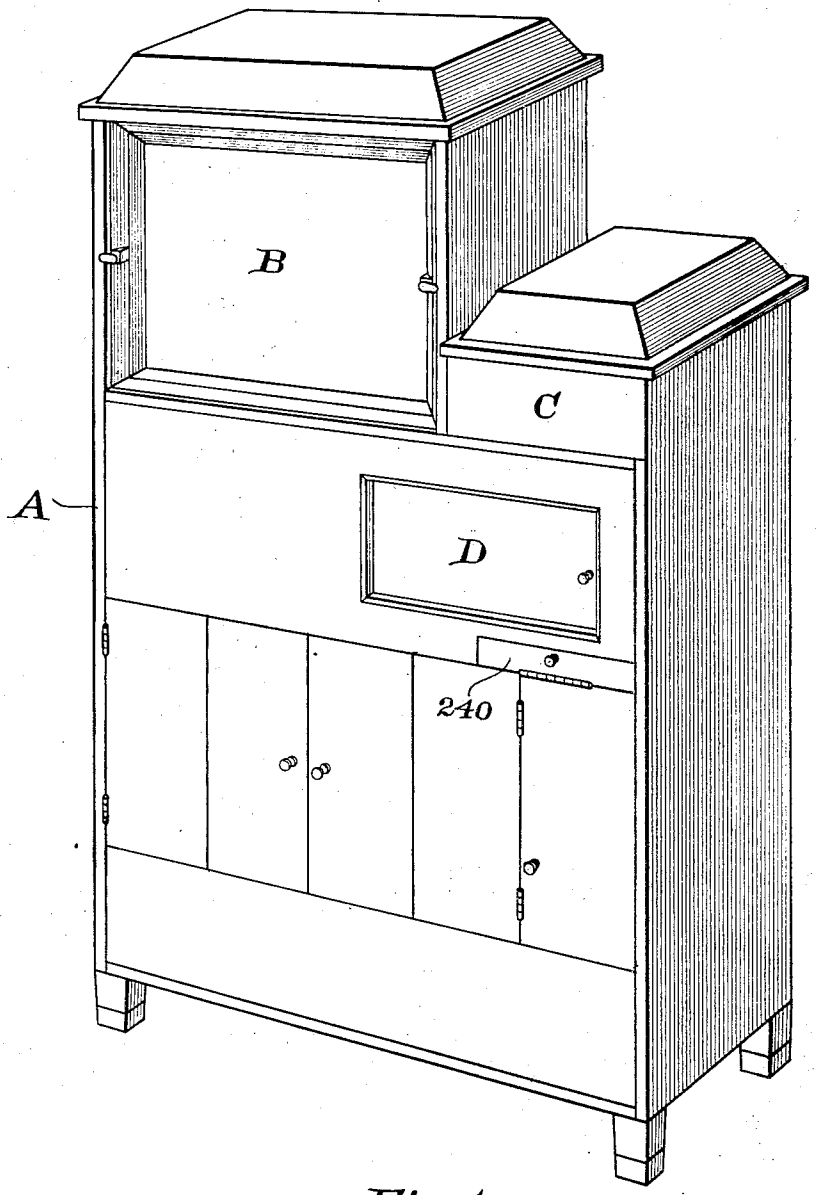


Fig. 1.

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MOVING PICTURE AND SOUND REPRODUCING MACHINE

Original Filed April 5, 1915 6 Sheets-Sheet 2

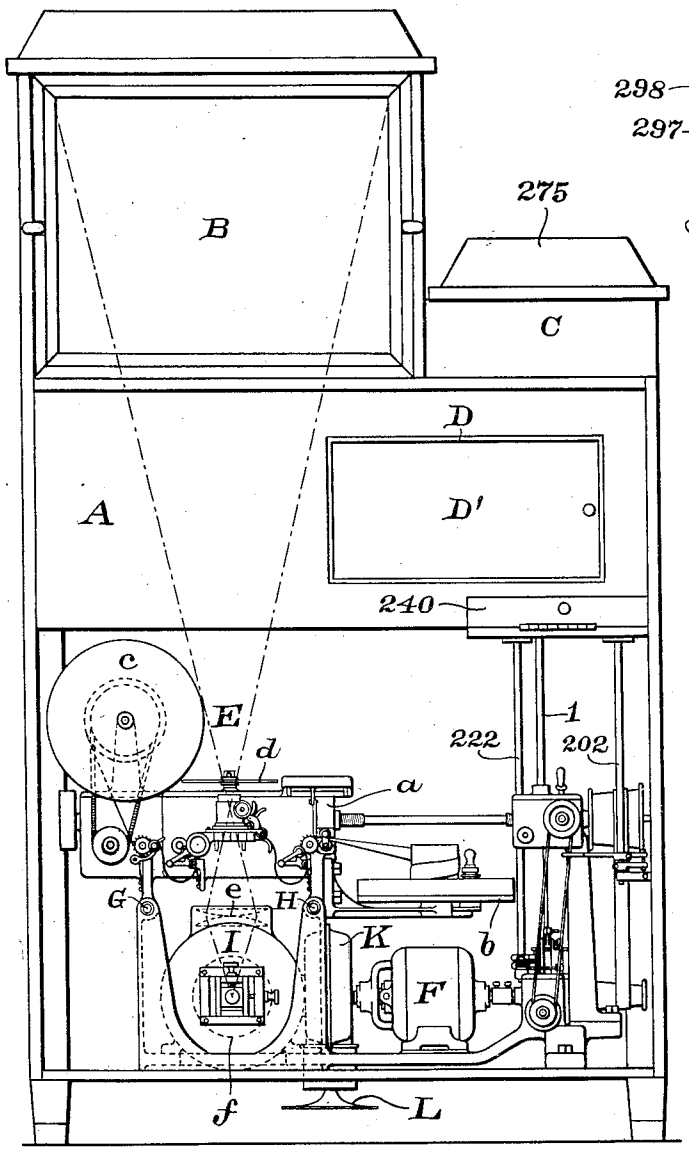


Fig. 2.

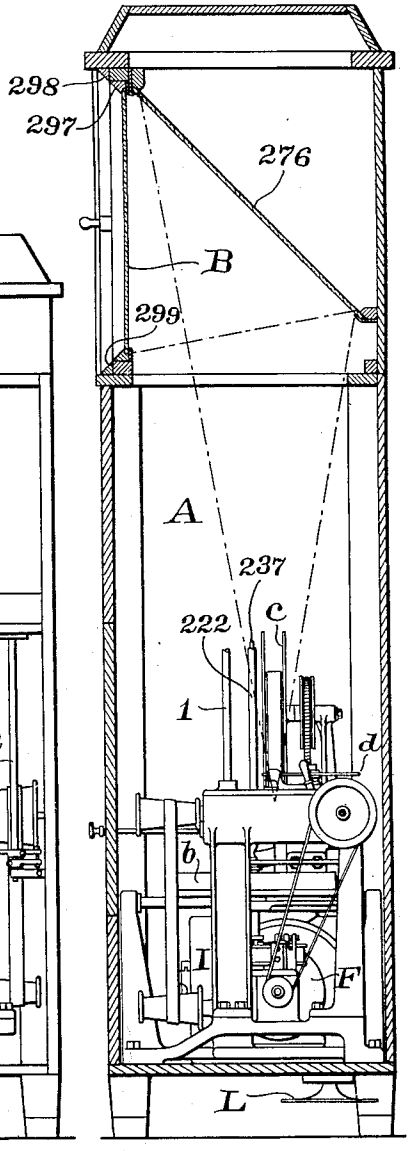


Fig. 3.

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MOVING PICTURE AND SOUND REPRODUCING MACHINE

Original Filed April 5, 1915 6 Sheets-Sheet 3

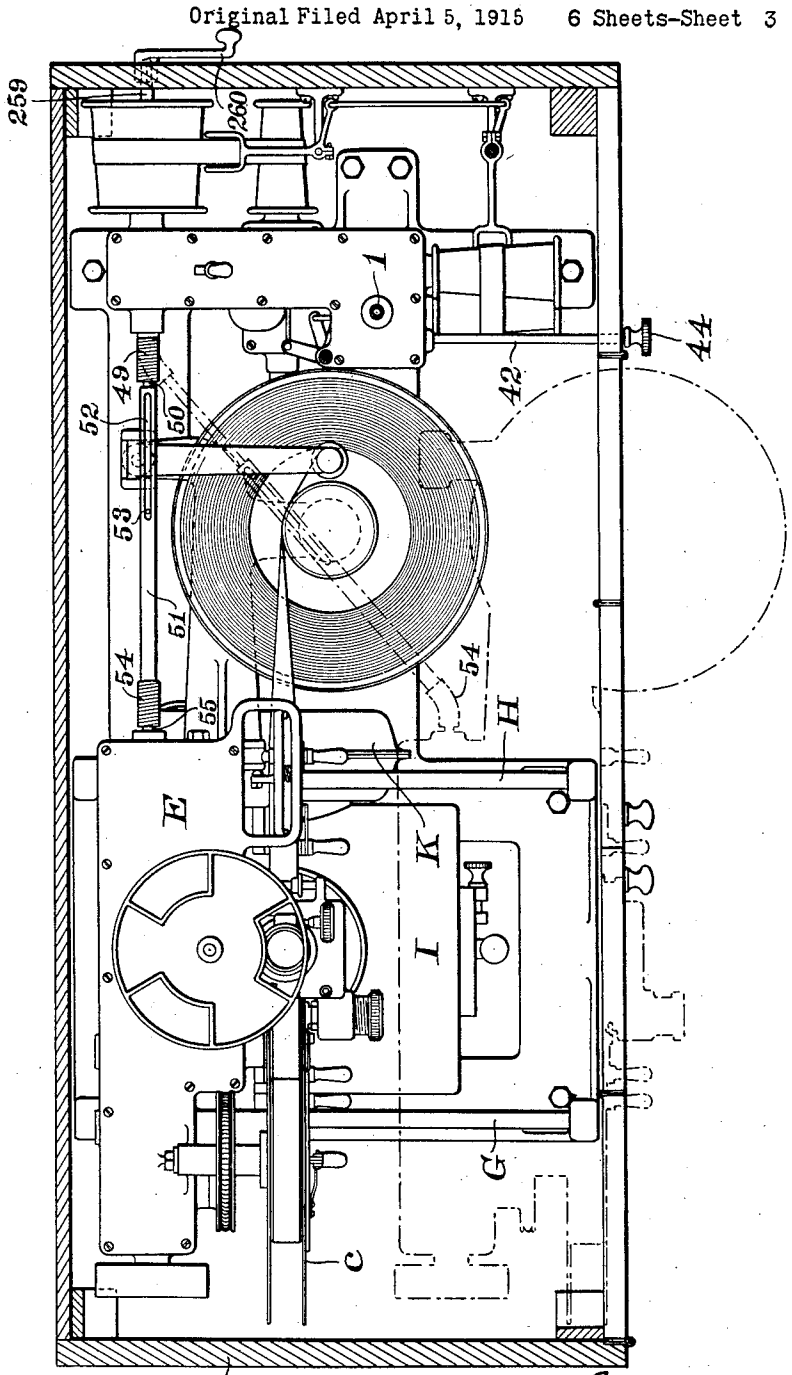


Fig. 4.

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MOVING PICTURE AND SOUND REPRODUCING MACHINE

Original Filed April 5, 1915 6 Sheets-Sheet 4

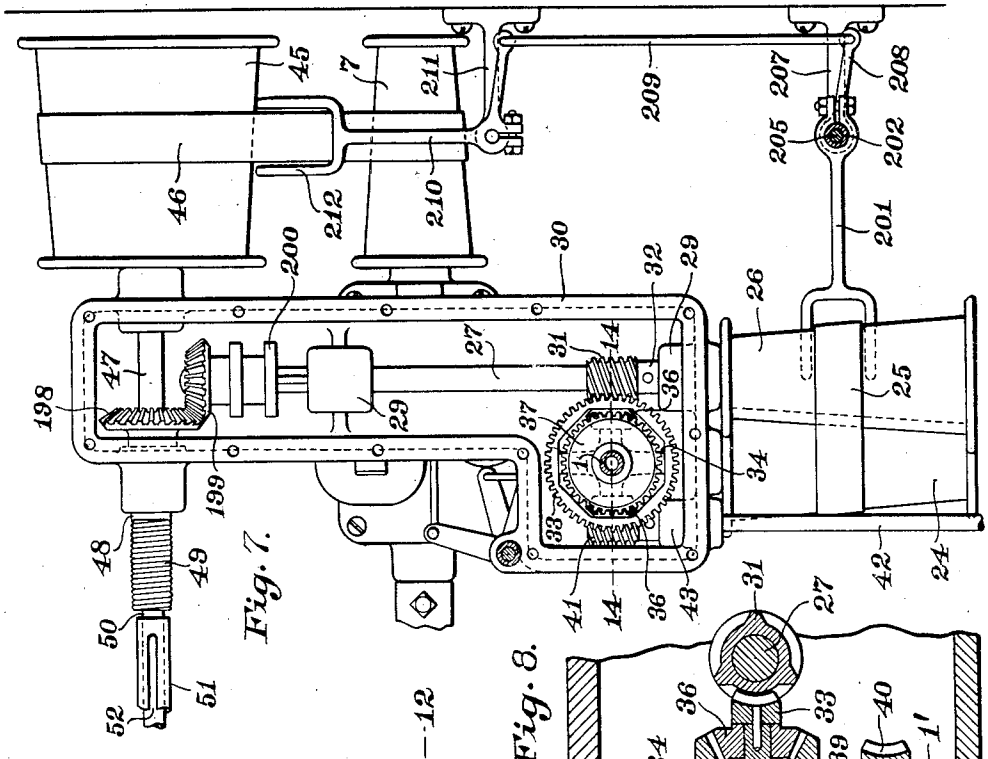


Fig. 7.

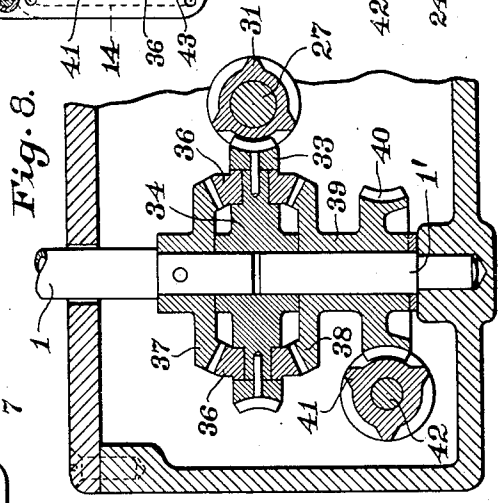


Fig. 8.

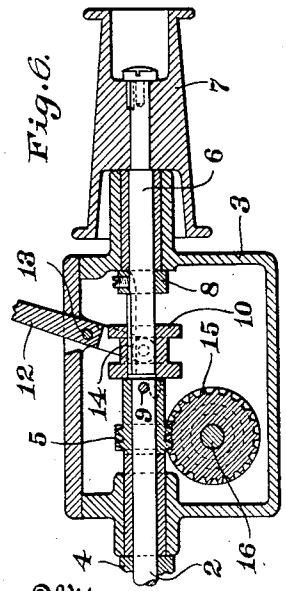


Fig. 6.

Fig. 5.

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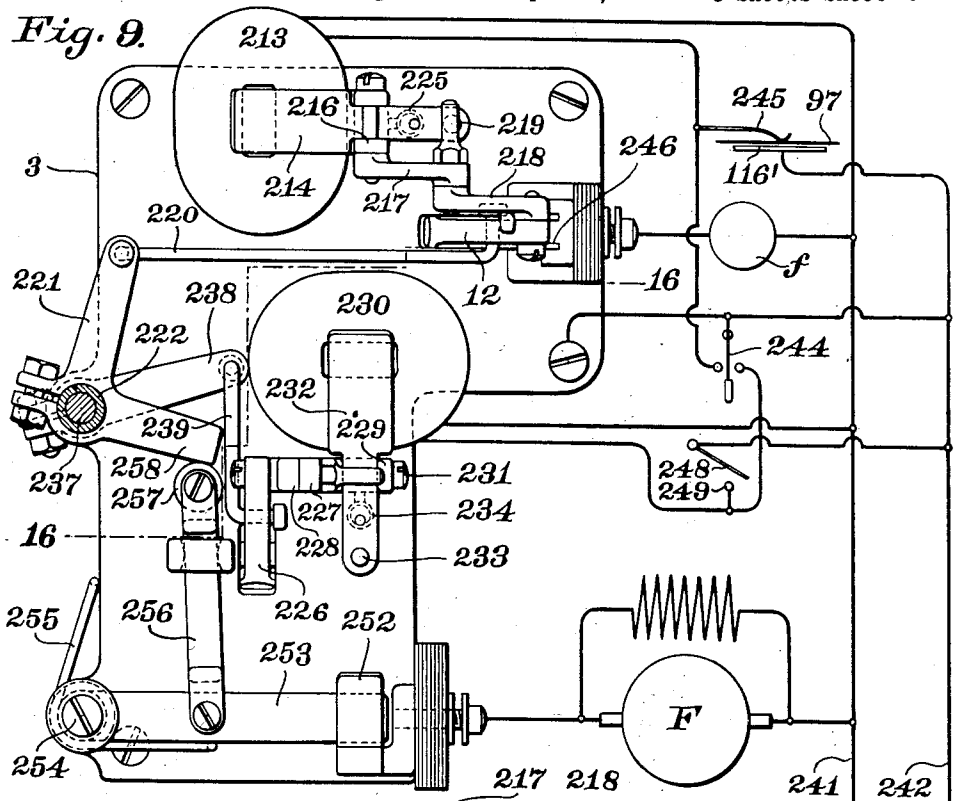
June 26, 1928. 1,674,946

A. D. BRIXEY

MOVING PICTURE AND SOUND REPRODUCING MACHINE

Original Filed April 5, 1915 6 Sheets-Sheet 5

Fig. 9.



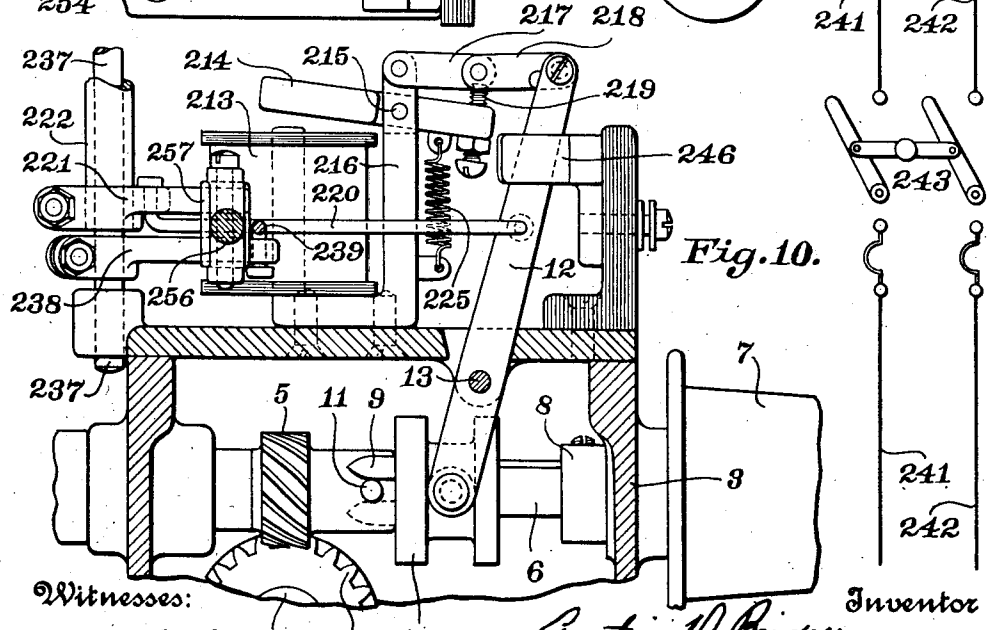


Fig. 10.

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A. D. BRIXEY

MOVING PICTURE AND SOUND REPRODUCING MACHINE

Original Filed April 5, 1915 6 Sheets-Sheet 6

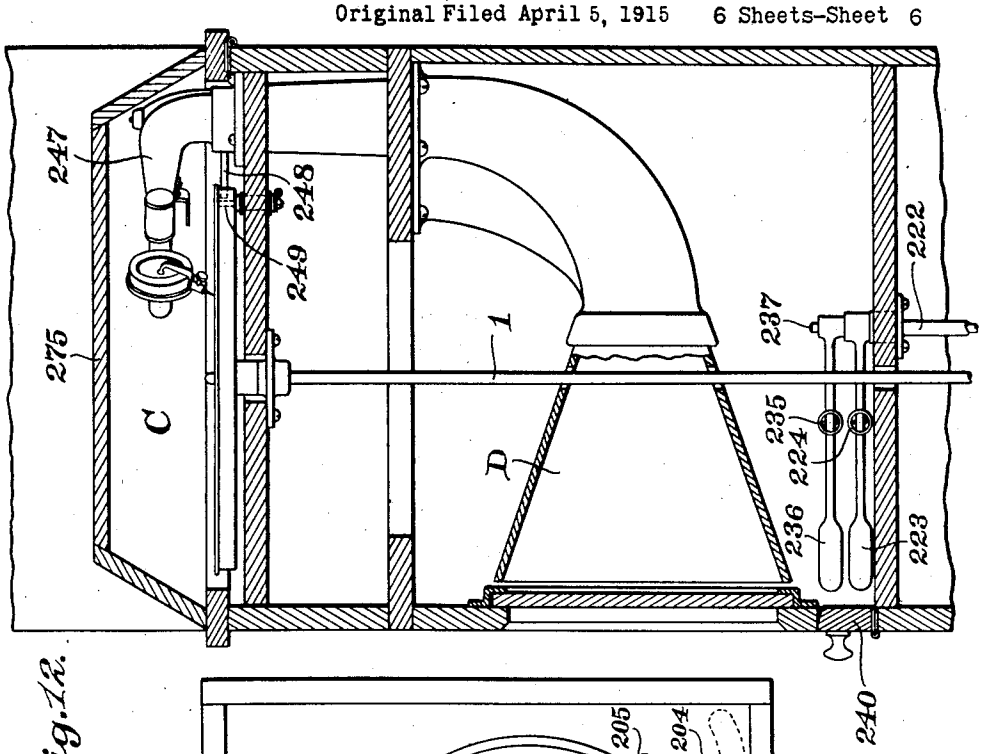


Fig. 12.

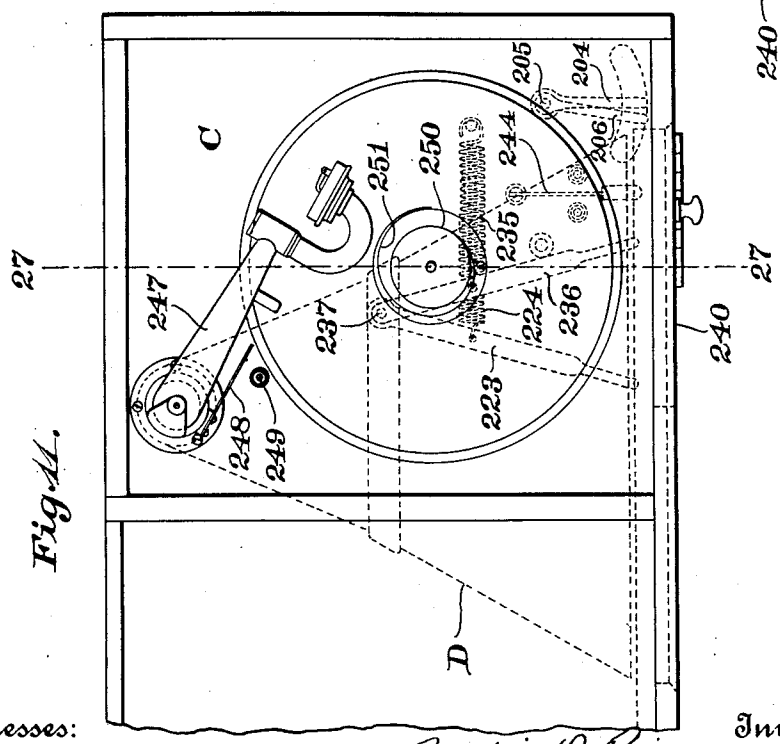


Fig. 11.

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Austin D. Brixey
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Patented June 26, 1928. 1,674,946

UNITED STATES PATENT OFFICE.

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MOVING-PICTURE AND SOUND-REPRODUCING MACHINE.

Application filed April 5, 1915, Serial No. 19,172. Renewed October 29, 1925.

This invention relates to moving picture machines and phonographs.

One object of the invention is to provide in a unitary cabinet a moving picture apparatus and a phonograph.

A further object of the invention is to provide means for synchronizing the moving pictures and the phonographic productions so that the sounds may be accurately fitted to the pictures as where persons in the pictures are supposed to be talking as enunciated by the phonograph.

A futher object of the invention is to provide means for controlling the moving picture apparatus and the phonograph.

Other and ancillary objects of the invention will appear hereinafter.

In the accompanying drawings, which illustrate the invention,

Fig. 1 is a perspective of a cabinet for moving picture and phonograph apparatus embodying the invention;

Fig. 2 is a front elevation of the apparatus, the lower door of the cabinet being removed;

Fig. 3 is a side elevation with the side of the cabinet removed;

Fig. 4 is a top plan view on an enlarged scale of the apparatus viewed from the line 4—4 of Fig. 2;

Fig. 5 is a top plan view of the gearing connecting the driving motor with the phonograph and motion picture apparatus, the top of the gear casing being removed;

Fig. 6 is a section on the line 12—12 of Fig. 5;

Fig. 7 is a top plan view of the gearing for driving the moving picture and phonograph apparatus and for holding the same in proper speed relation, the top of the gear box being removed;

Fig. 8 is a section on the line 14—14 of Fig. 7;

Fig. 9 is a top plan view of the clutch operating apparatus for controlling the moving picture apparatus and the phonograph;

Fig. 10 is a partial section on the line 16—16 of Fig. 9;

Fig. 11 is a top plan view of the phonograph;

Fig. 12 is a section through the top of the cabinet on the line 27—27 in Fig. 11.

Referring to the drawings, the apparatus comprises a casing or cabinet A within which the machinery is mounted. At the top of the front of the cabinet is a moving picture screen B and alongside it is a phonograph C, the sound issuing from the mouth of a horn D, the opening of which may be regulated by a slide D'. The moving picture apparatus E and the phonograph are driven from a motor F. The moving picture apparatus is connected by a flexible shaft with its driving means and is formed in a unit slidable upon rods G and H so that it may be pushed backward into normal operating position or drawn forwardly to the front of the casing so that it is readily accessible from the outside for the purpose of threading in the film or for other purposes.

The lamp of the projector is inclosed in a housing I which communicates with the intake of a blower K driven by the motor F. The air thus withdrawn from the lamp house is expelled downwardly through a flared outlet L. This air circulation keeps the lamp cool.

The phonograph may be of any of the well known types, for instance one employing a table adapted to receive a disk record, this table being at the upper end of the shaft 1 which is rotated by the electric motor F in the manner now to be described.

The shaft 2 of the motor F is journaled in the gear casing 3 and has a thrust collar 4 fixed thereon so as to prevent movement of the shaft through the bearing in one direction. On the other side of the bearing a spiral gear 5 is fixed upon the shaft and acts as a thrust collar which prevents endwise movement in the other direction. In line with the shaft 2 is a shaft 6 journaled in the casing. Outside this journal a cone pulley 7 is fixed upon the shaft 6. This cone pulley prevents endwise movement of the shaft in one direction while a thrust collar 8 on the inside of the bearing prevents endwise movement in an opposite direction. In order to throw the shafts 2 and 6 into and out of driving relation a detachable clutch between these shafts is provided and consists of pins 9 fixed to the shaft 2 and a grooved collar 10 splined upon the shaft 6 so as to be slidable thereon but not turnable with relation thereto. The collar 10 has a projection 11 which is extended into the path of the pins 9 when the clutch is in engaging position, so that the two shafts are locked and turn together. The collar 10 may be moved along the shaft 6 by means

of a lever 12 pivoted at 13 in the gear casing and having a forked end which straddles the collar, the extremities of the fork engaging in the groove of the collar 10. Preferably a roller as 14 is rotatably mounted on the end of each arm of the fork for engagement with the sides of the groove so as to reduce the friction.

The spiral gear 5 meshes with the spiral gear 15 which is fixed on the shaft 16 journaled in the bearing 17. The hub of the gear 15 on one side of the bearing and the thrust collar 18 fixed to the shaft 16 on the other side of the bearing, prevent endwise movement of the shaft. From the end of the shaft 16 is projected pins 19 adapted to be engaged by pins 20 projecting from a grooved collar 21 splined upon the shaft 22. This collar may be slid along the shaft to engage and disengage the pins 19 and 20 by means of a forked lever-arm projecting into the collar groove. By this means the shafts 16 and 22 may be connected in driving relation or disengaged therefrom.

The shaft 22 is journaled in the casing 3, having fixed upon it, on the inside of the bearing, a thrust collar 23 which prevents the shaft sliding outwardly through the bearing. Outside the casing a cone pulley 24 is fixed upon the shaft and serves as a thrust bearing to prevent the shaft 22 from sliding inwardly. The pulley 24 is connected by means of a belt 25 with a cone pulley 26 which is fixed on a shaft 27. This shaft turns in bearings 28 and 29 mounted on the casing 30. The pulley 26 acts as a thrust collar to prevent inward movement of the shaft 27. A worm 31 is fixed on the shaft 27 and an extension of its hub, or a separate thrust collar 32, prevents outward movement of the shaft 27.

The shaft 1 of the phonograph is driven from the worm 31 by apparatus now to be described. The worm engages a gear 33 fixed at the circumference of a spider 34 upon the arms 35 of which beveled gears 36 are rotatably mounted. These gears engage on one side with a beveled gear 37 fixed upon the shaft 1 and upon the other side with a gear 38. The gear 38 is fixed upon a sleeve 39 which is rotatably mounted upon the shaft 1 and also fixed to the sleeve 39 is a worm wheel 40. The worm wheel 40 engages with a worm 41 fixed to a shaft 42 which is journaled in the casing 30 at 43 and is provided with a thrust collar to prevent its endwise movement. This shaft 42 extends for some distance beyond the casing 30 where it is provided with a finger piece or handle 44 by which it may be turned. The shaft 42 is normally stationary and holds the worm wheel 40 and the gear 38 stationary. Rotation of the worm 31 rotates the spider 34 and the gears 36, rolling upon the stationary gear 38, turn the gear 37 and with it the phonograph shaft 1. If the gear 38 were entirely free to move, the spider 34 would be ineffective to produce rotation of the gear 37 and any movement of the gear 38 alters the speed relations of the shaft 1 and the driving means. This is taken advantage of to produce a change in the phase relations of the driving means and the phonograph. This is brought about by turning the shaft 42 in one direction or the other. Movement of the gear 38 in one direction or the other is thus accomplished and the speed of the shaft 1 is increased or decreased with relation to the driving means during the period of movement of the gear 38. The phase of the phonograph is thus advanced or retarded with relation to the driving means and the gear 38, having again assumed its normal stationary condition, the relative speeds of the phonograph and driving means will be as before but their relative phase will have been shifted. This aids in synchronizing different parts of the apparatus which will be hereinafter referred to.

In threading in a new film or in any other operations in which access to the moving picture apparatus is to be had, it is more or less inconvenient if this apparatus occupies its normal position within the cabinet. For this reason the moving picture apparatus is formed into an unitary structure which may be moved from its normal position in the cabinet to a position where it is more readily accessible. To this end the rods G and H are supported by stationary posts or standards projecting upwardly from the base and the apparatus, referred to above as movable, is formed in a unitary structure to slide upon these bars. This unitary structure comprises a gear casing *a* having mechanism adapted to drive the film and reels, the paying-out reel *b* for the film, the take-up reel *c* for the film, the shutter *d*, the intermittent and steady feeds for the film and the object lenses, the condenser lenses *e* being mounted upon the house or casing of the lamp *f*. The structures thus referred to in a general way will now be referred to in detail.

The moving picture apparatus is driven from the pulley 7 which is connected with the cone pulley 45 by a belt 46. The pulley 45 is fixed upon a shaft 47 journaled in the gear casing 30. The pulley 45 acts as a thrust collar to prevent movement of the shaft 47 in one direction while a thrust collar 48 prevents endwise movement of the shaft in the opposite direction. The shaft 47 is connected by a flexible connection 49, such as a coiled steel spring, with a shaft 50. This shaft 50 is joined by a telescopic connection with a shaft 51 which is hollow so as to receive the end of the shaft 50 and has a slot 52 into which projects a pin 53 on the

shaft 50. Relative sliding of the shafts 50 and 51 but not relative turning is thus provided for. The shaft 51 is connected by a flexible coupling 54, similar to the coupling 49, with the shaft 55 journaled in the gear casing 56 at the bearings 57, 58 and 59. The flexible and telescopic connections just described furnishes the driving means between the stationary driving apparatus and the shiftable motion picture apparatus.

In order to insure that the moving picture apparatus and the phonograph shall run in the right relation, the moving picture drive shaft 47 is detachably connected with the shaft 27 from which the phonograph is driven by means of beveled gears 198 fixed upon the shaft 47 and 199 splined upon the shaft 27 so that it may slide out of and into mesh with the gear 198. Connected with the gear 199 is a grooved collar 200 similar to the grooved collar 10 and which may be operated by a lever to slide the gear back and forth upon the shaft 27. When the gears 198 and 199 are out of mesh the phonograph and moving picture apparatus may be operated independently while, as before stated, the two apparatus are held in proper relation when the gears 198 and 199 are in engagement.

When running independently the phonograph may be regulated in speed by shifting the belt 25 longitudinally of the pulleys 24 and 26 while the speed of the moving picture apparatus may be regulated by shifting the belt 46 upon the pulleys 7 and 45. The belt 25 may be shifted by means of a belt shifter 201 which embraces the belt 25 and is fixed to the sleeve 202 which carries at its upper end a handle 204 by which it may be turned to shift the belt. Within the sleeve 202 is a shaft 205 having fixed to it at its upper end a handle 206 by which it may be turned. At its lower end it is journaled in a bracket 207. Fixed to the shaft 205 is an arm 208 pivoted to a link 209 which in turn is pivoted to one end of a bell crank 210 pivoted at its angle in the bracket 211. The other end of the bell crank terminates in the belt shifter 212 which embraces the belt 46. It will thus be apparent that the handles 204 and 206 can be used to shift the phonograph driving belt and moving picture driving belt respectively by moving them in one direction or the other. If when the phonograph and moving picture driving means are connected together by throwing the gears 198 and 199 into mesh, the belts 25 and 46 are not so positioned as to accurately adjust the speeds to each other, belt slippage will permit the operation of the device and the slipping can be removed by suitably shifting the belts. In order that the phonograph or the moving picture apparatus may not continue operating after the record or film has been completed, whether the operator is attentive or not, automatic means is provided for stopping the mechanism when the last of the film has passed or when the record has been completed. The stoppage of the mechanism may, however, be effected at any desired time.

As has been before explained the moving picture apparatus may be disconnected from the driving mechanism by disengaging the pins 9 and 11. Also the phonograph may be disconnected from the driving mechanism by disengaging the pins 19 and 20. To operate the moving picture control clutch lever 12 a magnet 213 is mounted upon the casing 3. The armature 214 of this magnet is pivoted at 215 upon the post 216 fixed to the casing 3 and forms a part of the magnetic circuit of the magnet 213. Pivoted between the lever 12 and the post 216 are two toggle links 217 and 218. Upon the tail of the armature 214 is an adjustable stop screw 219 adapted to engage with the knee of the toggle and so adjusted that when the screw is in its lower position the toggle will be slightly over set so as to hold the lever 12 in position to drive the moving picture apparatus. When the magnet 213 is energized and its armature attracted the screw 219 will break the toggle. The arm 12 will then be thrown by a spring, presently to appear, so that the moving picture apparatus will be disconnected.

To provide for the resetting of the clutch to connect the moving picture apparatus a link 220 is pivoted to the lever 12 and also to the arm 221 which is fixed upon the sleeve 222. This sleeve is extended vertically and at its upper end is provided with a handle 223 which tends to move under the influence of a spring 224 in such direction as to throw the clutch control lever 12 into disconnecting position. A spring 225 normally holds the armature 214 retracted from the magnet.

To operate the clutch connecting the phonograph a lever arm 226 is provided connected by toggle links 227 and 228 with the post 229 fixed to the casing 3. This post forms a part of the magnetic circuit of the electromagnet 230 and has pivoted to it at 231 the armature 232 of that electro-magnet. The tail of the armature 232 carries an adjustable stop screw 233 which, when the armature is retracted by the spring 234, permits the toggle to be slightly over set so as to hold the clutch lever in connecting position. When the magnet 230 is energized and its armature retracted, the screw on the tail of the armature kicks open the toggle and permits the lever to move into disconnecting position under the influence of a spring 235 connected with the handle 236 which is fixed upon the shaft 237, extending through the sleeve 222 and being journaled at its lower end in the casing 3. This shaft

is connected with the lever 226 by means of an arm 238 fixed upon it and a link 239 pivoted to that arm and to the lever 226. While the springs 234 and 235 tend to throw out the phonograph and moving picture clutches, movement of the handles 223 and 236 against the springs will throw the clutch levers into connecting position where they will be held by their toggles. Access to these handles may be had through an opening in the front of the cabinet closed by a door 240.

In the drawing (see particularly Fig. 9) 241 and 242 are the electric supply means which may be connected and disconnected by means of the double pole switch 243. The circuit of the magnet 213 or of the magnet 230 may be closed at will by means of the two way-switch 244, this affording a means for throwing either or both the phonograph and moving picture apparatus out of operation at will, while either or both of these apparatus may be thrown into operation at will by means of the handles 223 and 236 as before described. One terminal of the line is connected with the frame of the machine upon which the moving picture film runs while one terminal of the electromagnet 213 is connected with the spring 245 which is insulated from the frame. The other terminal of the magnet is connected with the other side of the line. The contact 245 is normally held out of engagement with the frame because of the film being interposed. When the film has been used up and therefore withdrawn from between the spring contact and the frame, the circuit of the magnet 213 is completed and the moving picture clutch is thrown out of operation. The clutch lever 12 serves as the arm of a switch for making the circuit of the projector lamp. One terminal of this lamp is connected with the supply main 241 while the other terminal is connected with the switch clips 246 which are insulated from the frame. When in engagement with the lever 12 they are electrically connected with the frame and thence to the line 242, so that the circuit of the lamp is completed when the motion picture clutch is in connecting position and is automatically extinguished when the clutch is disconnected. To throw the phonograph out of operation when a record has been completed, the phonograph sound arm 247 carries an insulated spring contact 248. Mounted upon the cabinet is uninsulated contact 249 adapted to be engaged by the contact 248 when the sound arm has moved inward sufficiently. At the central part of the record disk is provided a groove 250 which is connected with the sound groove by a steeply inclined spiral groove 251. While the needle is moving across the record the contacts 248 and 249 will be open but as soon as the end of the sound groove is reached the needle is quickly carried into the groove 250 when the contacts 248 and 249 will come into engagement. This will complete the circuit of the magnet 230, one terminal of that magnet being connected with the line 241, the other terminal being connected with the contact 249 and the contact on the sound arm being connected with the line 242.

The motor F, which is preferably of the shunt or compound type has one terminal connected with the line 241 while the other terminal is connected with the insulated switch clips 252 which are adapted to engage with the switch blade 253 pivoted to the frame at 254. Being pivoted to the frame the blade is connected with the line 242. A spring 255 tends to hold the switch open. It is closed by an endwise movable push bar 256 pivoted at one end to the switch blade and at its other end carrying a roller 257 adapted to be engaged by the arm 258 fixed upon the sleeve 222, when the moving picture clutch is in connecting position. When the phonograph clutch is also in connecting position the arm 238 will lie alongside the frame 238 and both will bear upon the roller 257 and thrust the switch blade 253 into closed position. When both the clutches are in disconnected position, both the arms 238 and 258 will be moved away from the roller so that the spring 255 may force the switch blade 253 into open position. So long, however, as either of the clutches is in connecting position one of the arms will be against the roller 257 and the motor switch will be held closed. When both of the clutches are open the motor switch will be automatically opened and the power cut off from the motor.

In some cases it may be desired to use the projecting apparatus like a magic lantern that is, where a picture is placed in position and maintained for some time in the line of projection, a still picture being thrown upon the screen. Pictures of this character may be printed upon the film and successively exhibited upon the screen by moving the film through the projector step by step to exhibit the successive pictures, each picture remaining in position as long as desired. To this end the shaft 47 may be extended as at 259 and provided with a square end adapted to fit in the square socket of a handle 260 an opening in the casing being provided for this purpose. It will now be apparent that upon disconnecting the moving picture clutch and the gears 198 and 199 the film advancing means may be operated as desired by turning the handle 260. At the same time the phonograph may be operated by the motor if desired.

It will now be apparent that, if the main switch 253 be closed, and either the clutch for operating the moving picture apparatus or that for operating the phonograph, or

both, be thrown into engagement by the handles 223 and 236 respectively, the motor will start into operation. One of the clutches must, however, be in engagement to secure closing of the motor circuit. If neither is in engagement, the motor will be open circuited, thus avoiding waste of power when neither the moving picture apparatus or the phonograph is in operation. Either or both of the clutches may be thrown into engagement at will by the handles mentioned so that either or both the moving picture apparatus and the phonograph may be operated as desired. The speed of the two apparatus may be respectively regulated by shifting the belts 25 and 46 by means of the handles 204 and 206. The clutches may be thrown out of engagement so as to disconnect the moving picture apparatus and the phonograph respectively by means of the switch 244 acting through the electromagnets 213 and 230. Also the clutch for the phonograph is thrown out upon the closing of the contacts 248 and 249 by the sound arm after a record has been completed, while the clutch for the picture apparatus is disconnected when the contacts 245 and 116′ engage after a film has completed its run.

When the phonograph and picture apparatus are operated together and the sounds from the phonograph should correspond with showings of the pictures, as, for instance, where an actor in the pictures is supposed to be speaking or singing the words emitted from the phonograph, the picture apparatus may be connected in rigid speed relationship by means of the gear 199 being thrown into engagement with the gear 198 on the picture drive shaft, connection with the phonograph drive being made through the shaft 27 and gearing as before described, the gears 198 and 199 being disengaged when it is desired to operate either the picture apparatus or the phonograph alone, or when it is desired to operate them together, but independently. The two apparatus may be held in the proper speed relationship, as described, but if under such circumstances incidents of the phonograph and pictures which should be co-incident are separated by a time interval, in other words if the incidents are out of phase, the result is confusing. Such a situation exists where an actor in the picture does something which should be coincident with certain words which are produced later or earlier by the phonograph. By means of gearing, as before described, operated by the rod 42, the pictures and phonograph may be brought into proper phase relationship.

While the invention has been described in what is considered its best application, it may have other embodiments without departing from its spirit and is not limited to the structure shown in the drawings.

What I claim as new and desire to secure by Letters Patent is:

1. The combination with a moving picture apparatus, of a phonograph, driving means therefor, means for connecting either said apparatus or said phonograph with said driving means at will independently of the other, and means for connecting said apparatus and phonograph together, the last mentioned means including means for adjusting the phase relation of said apparatus and phonograph.

2. The combination with a moving picture apparatus, of a phonograph, driving means therefor, means for connecting said apparatus and phonograph together, said means comprising means for detachably connecting said apparatus and phonograph and means operable during the operation of said apparatus and phonograph to gradually adjust their phase relation to secure the proper synchronous relation, and means for connecting the connected apparatus and phonograph to said driving means at will.

3. The combination with motion picture apparatus of a phonograph, driving means therefor, means for connecting said apparatus and phonograph together at will, means for connecting the connected apparatus and phonograph to said driving means at will, said means comprising means for independently connecting said apparatus and phonograph to said driving means at will.

4. The combination with a phonograph, of driving means therefor, a moving picture apparatus, driving means therefor, means for automatically disconnecting said apparatus from its driving means, means for automatically disconnecting said phonograph from its driving means and means for detachably connecting said apparatus and phonograph together to secure proper synchronous relation.

5. The combination with a phonograph and moving picture apparatus, a motor for driving said phonograph and apparatus, means for automatically disconnecting said phonograph from said motor, means for automatically disconnecting said apparatus from said motor and means for automatically shutting down said motor when both the phonograph and moving picture apparatus are out of operation.

Signed at San Francisco in the county of San Francisco and State of California, this 15th day of March A. D. 1915.

AUSTIN D. BRIXEY.